B+K PRECISION DYNASCAN CORPORATION

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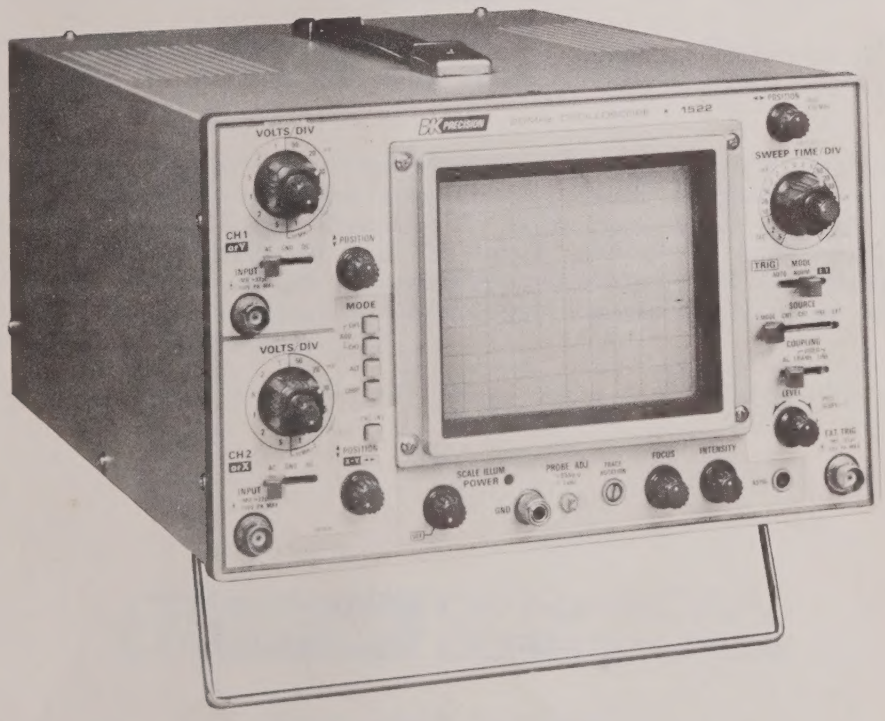
SERVICE MANUAL

Models 1466A, 1476A and 1522 OSCILLOSCOPES



B+K PRECISION DYNASCAN CORPORATION

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SERVICE MANUAL

for

B & K-PRECISION

Model 1466A 10 MHz Single-Trace
Model 1476A 10 MHz Dual-Trace
Model 1522 20 MHz Dual-Trace
OSCILLOSCOPES

WARNING

This service manual is intended for use by qualified electronics technicians only. To avoid electric shock, do not perform servicing unless you are qualified to do so.

High voltages up to 6,000 volts dc (Model 1522) or 2,000 volts dc (Models 1466A and 1476A) are present when this instrument is operating. Line voltage (120 or 220 Vac) is present on the power input circuit whenever the ac power cord is connected to a live outlet, even if the oscilloscope is turned off. Observe all high voltage safety precautions when the housing is removed from the oscilloscope. Contacting exposed high voltage could result in fatal electric shock.

B+K PRECISION DYNASCAN CORPORATION

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Use this address for technical inquiries and replacement parts orders

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REFERENCE PUBLICATIONS

Model 1466A/1476A Instruction Manual	480-378-9-001
Model 1522 Instruction Manual	480-379-9-001
Model 1466A Composite (Schematic Diagram and Parts List)	499-276-9-001
Model 1476A Composite (Schematic Diagram and Parts List)	499-277-9-001
Model 1522 Composite (Schematic Diagram and Parts List)	499-278-9-001

DIFFERENCES BETWEEN MODELS

SIMILARITIES

Because **B & K-Precision** Model 1466A, 1476A, and 1522 Oscilloscopes have so many similarities in mechanical construction and circuit design, these three models are covered in the same service manual. Most of the servicing information is applicable to all three models. The major differences are summarized below.

This service manual **does not** apply to earlier version Models 1466 and 1476, respectively. The Model 1466A and 1476A are a new generation of instruments based upon a different mechanical and electrical design.

MODEL 1466A

The Model 1466A is a single-trace oscilloscope with 10 MHz bandwidth. Since it is a single-trace version, it has only two operating modes: sweep and X-Y. The vertical attenuator and single-channel vertical amplifier are always used for vertical deflection. A separate horizontal amplifier circuit (not found in the 1476A or 1522) is used in the X-Y mode. Horizontal input is applied at the EXT TRIG jack. The sweep circuit has three trigger source possibilities: internal, external, or line. High voltage for the CRT is -2 kV (cathode), with grounded anode.

MODEL 1476A

The Model 1476A is very similar to the 1466A in many respects, but is a dual-trace oscilloscope. Since it is a dual-trace version, if offers several modes of vertical display: CH 1, CH 2, ADD, DUAL CHOP, or DUAL ALTERNATE. It contains two vertical attenuators, CH 1 and CH 2, each identical to that used in the 1466A. The channel 2 input is used for horizontal deflection in the X-Y mode. The vertical amplifier includes two preamplifier and intermediate amplifiers, each similar to that used in the 1466A, except that the polarity of channel 2 may be inverted if desired. Vertical mode logic circuits are added that determine whether channel 1 or channel 2 is displayed at a given time. After vertical mode switching, the vertical signal is routed to a vertical output amplifier that is essentially identical to the 1466A.

The sweep generator is basically the same as used in the 1466A. Because of dual-trace operation, trigger source choices are expanded to include: V. MODE, CH 1, CH 2, EXT, or LINE. The chop oscillator and circuits to synchronize vertical logic control circuit with the sweep are added.

The power supply and CRT are the same as used in Model 1466A.

MODEL 1522

The dual-trace Model 1522 is very similar in functional operation to dual-trace Model 1476A. However, since bandwidth is increased to 20 MHz, some circuit differences are noted. The vertical attenuators contain additional RC coupled frequency compensation transistors. Different transistor types and different frequency compensation networks of the vertical amplifier will be noted.

The sweep generator has one additional higher sweep rate, 0.2 μs/div. The 1522 uses a different CRT than the 1476A, and high voltages of -1.5 kV (cathode) and +4.5 kV (anode) are used for a total 6 kV acceleration voltage, as compared to 2 kV for Models 1466A and 1476A.

Convenience features found only on Model 1522 include the circuits that provide the CH 1 OUT signal and continuously variable scale illumination for the graticule.

SPECIFICATIONS

MODEL 1466A

CRT

Type
150GTM31.

Dimensions
(See Fig. 1)

Useful Display Area
Y axis = 80 mm.
X axis = 100 mm.

Face Plate Dimension
149 ±3 mm.

Overall Length
355 mm max.

Screen Shape
Rectangular, flat face, non-metal back.

Graticule
Internal, 8 x 10 divisions, 1 div = 10 mm.

Deflection and Focusing
Electrostatic deflection, electrostatic focusing.

Acceleration Voltage
2 kV.

Phosphor
Green, medium short persistence.

Heater
6.3 volts, 95 mA.

Weight
920 grams.

Basing
See Fig. 2.

MODEL 1476A

CRT

Type
150GTM31.

Dimensions
(See Fig. 1)

Useful Display Area
Y axis = 80 mm.
X axis = 100 mm.

Face Plate Dimension
149 ±3 mm.

Overall Length
355 mm max.

Screen Shape
Rectangular, flat face, non-metal back.

Graticule
Internal, 8 x 10 divisions, 1 div = 10 mm.

Deflection and Focusing
Electrostatic deflection, electrostatic focusing.

Acceleration Voltage
2 kV.

Phosphor
Green, medium short persistence.

Heater
6.3 volts, 95 mA.

Weight
920 grams.

Basing
See Fig. 2.

MODEL 1522

CRT

Type
150FTM31.

Dimensions
(See Fig. 1)

Useful Display Area
Y axis = 80 mm.
X axis = 100 mm.

Face Plate Dimension
149.3 ±3 mm.

Overall Length
330 mm max.

Screen Shape
Rectangular, flat face, non-metal back.

Graticule
Internal, 8 x 10 divisions, 1 div = 10 mm, illuminated.

Deflection and Focusing
Electrostatic deflection, electrostatic focusing, post deflection acceleration.

Acceleration Voltage
6 kV.

Phosphor
Green, medium short persistence.

Heater
6.0 volts, 75 mA.

Weight
900 grams.

Basing
See Fig. 3.

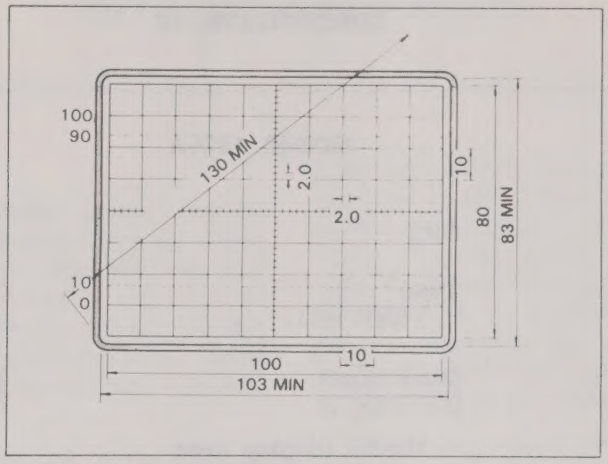


Fig. 1. Graticule Dimensions.

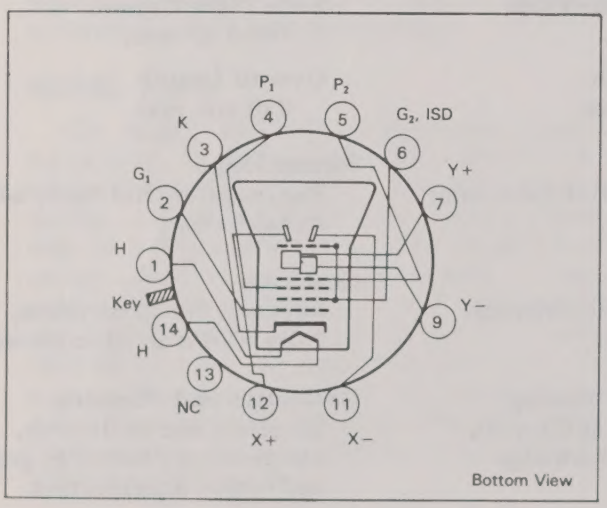


Fig. 2. 150GTM31 Basing.

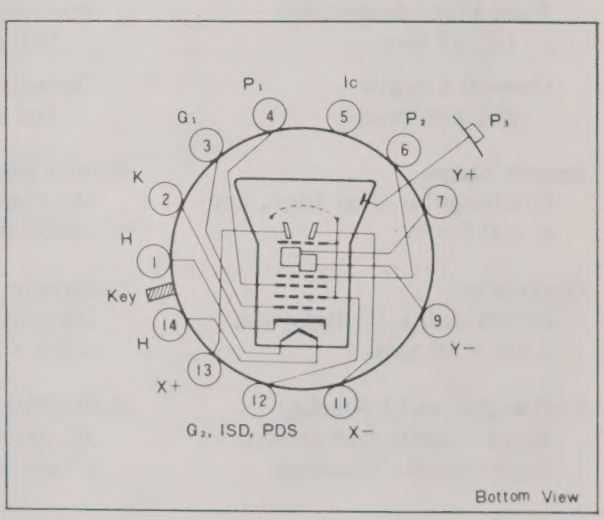


Fig. 3. 150FTM31 Basing.

MODEL 1466A

VERTICAL AXIS

Sensitivity
1 mV/div to 5 V/div, ±3%.

Attenuator
12 steps, 1 mV/div to 5 V/div in 1-2-5 sequence. Vernier control for fully adjustable sensitivity between steps.

MODEL 1476A

VERTICAL AXIS (CH 1 and CH 2)

Sensitivity
1 mV/div to 5 V/div, ±3%.

Attenuator
12 steps, 1 mV/div to 5 V/div in 1-2-5 sequence. Vernier control for fully adjustable sensitivity between steps.

MODEL 1522

VERTICAL AXIS (CH 1 and CH 2)

Sensitivity
1 mV/div to 5 V/div, ±3%.

Attenuator
12 steps, 1 mV/div to 5 V/div in 1-2-5 sequence. Vernier control for fully adjustable sensitivity between steps.

MODEL 1466A

VERTICAL AXIS
(continued)

Input Impedance
1 MΩ ±2% shunted by approx. 35 pF.

Frequency Response
2 mV/div to 5 V/div
DC: DC to 10 MHz, -3 dB.
AC: 5 Hz to 10 MHz, -3 dB.
1 mV/div
DC: DC to 7 MHz, -3 dB.
AC: 5 Hz to 7 MHz, -3 dB.

Rise Time
2 mV/div to 5 V/div
35 ns or less.
1 mV/div
50 ns or less.

Overshoot
5% or less, 100 kHz square wave.

Maximum Input Voltage
500 V p-p or 250 V (dc + ac peak).

Maximum Non-Distorted Amplitude
More than 6 divisions, dc to 10 MHz.

MODEL 1476A

VERTICAL AXIS - CH 1 and CH 2
(continued)

Input Impedance
1 MΩ ±2% shunted by approx. 35 pF.

Frequency Response
2 mV/div to 5 V/div
DC: DC to 10 MHz, -3 dB.
AC: 5 Hz to 10 MHz, -3 dB.
1 mV/div
DC: DC to 7 MHz, -3 dB.
AC: 5 Hz to 7 MHz, -3 dB.

Rise Time
2 mV/div to 5 V/div
35 ns or less.
1 mV/div
50 ns or less.

Overshoot
5% or less, 100 kHz square wave.

Maximum Input Voltage
500 V p-p or 250 V (dc + ac peak).

Maximum Non-Distorted Amplitude
More than 6 divisions, dc to 10 MHz.

Operating Modes
CH 1: Single trace.
CH 2: Single trace.
ADD: CH 1 + CH 2 single trace.
ALT: Dual trace, alternate sweep.
CHOP: Dual trace, chopped sweep.

Chop Frequency
Approx. 250 kHz.

CH 2 Polarity
Normal or inverted.

Crosstalk
-40 dB minimum.

MODEL 1522

VERTICAL AXIS - CH 1 and CH 2
(continued)

Input Impedance
1 MΩ ±2% shunted by approx. 32 pF.

Frequency Response
2 mV/div to 5 V/div
DC: DC to 20 MHz, -3 dB.
AC: 5 Hz to 20 MHz, -3 dB.
1 mV/div
DC: DC to 10 MHz, -3 dB.
AC: 5 Hz to 10 MHz, -3 dB.

Rise Time
2 mV/div to 5 V/div
17.5 ns or less.
1 mV/div
35 ns or less.

Overshoot
5% or less, 100 kHz square wave.

Maximum Input Voltage
500 V p-p or 250 V (dc ac peak).

Maximum Non-Distorted Amplitude
More than 8 divisions, dc to 20 MHz.

Operating Modes
CH 1: Single trace.
CH 2: Single trace.
ADD: CH 1 + CH 2 single trace.
ALT: Dual trace, alternate sweep.
CHOP: Dual trace, chopped sweep.

Chop Frequency
Approx. 250 kHz.

CH 2 Polarity
Normal or inverted.

Crosstalk
-40 dB minimum.

MODEL 1466A

HORIZONTAL AXIS
(X10 MAG not included)

Operating Mode
X-Y mode selectable with TRIG MODE switch. VERT INPUT = Y axis, EXT TRIG INPUT = X axis.

Sensitivity
100 mV/div.

Input Impedance
1 MΩ ±2%, approx. 35 pF.

Frequency Response
DC: DC to 500 kHz, -3dB.

X-Y Phase Difference
3° or less at 50 kHz.

Maximum Input Voltage
50 V (dc + ac peak).

SWEEP

Type
NORM: Triggered sweep.
AUTO: Sweep free runs in absence of trigger.

Sweep Time
0.5 µs/div to 0.5 s/div, ±3% in 19 ranges, in 1-2-5 sequence. Vernier control provides fully adjustable sweep time between steps.

Sweep Magnification
X10 (ten times), ±5%.

Linearity
±3% all ranges.

MODEL 1476A

HORIZONTAL AXIS (Input thru CH 2, X10 MAG not included)

Operating Mode
X-Y mode selectable with TRIG MODE switch.
CH 1 = Y axis,
CH 2 = X axis.

Sensitivity
Same as vertical axis.

Input Impedance
Same as vertical axis.

Frequency Response
DC: DC to 500 kHz, -3 dB.
AC: 5 Hz to 500 kHz, -3 dB.

X-Y Phase Difference
3° or less at 50 kHz.

Maximum Input Voltage
Same as vertical axis.

SWEEP

Type
NORM: Triggered sweep
AUTO: Sweep free runs in absence of trigger.

Sweep Time
0.5 µs/div to 0.5 s/div, ±3% in 19 ranges, in 1-2-5 sequence. Vernier control provides fully adjustable sweep time between steps.

Sweep Magnification
X10 (ten times), ±5%.

Linearity
±3% all ranges.

MODEL 1522

CH 1 OUTPUT

Output Voltage
Approx. 50 mV/div into 50 Ω.

Output Impedance
Approx. 50 Ω.

Frequency Response
100 Hz to 20 MHz (-3 dB) into 50 Ω.

HORIZONTAL AXIS (Input thru CH 2, X10 MAG not included)

Operating Mode
X-Y mode selectable with TRIG MODE switch.
CH 1 = Y axis,
CH 2 = X axis.

Sensitivity
Same as vertical axis.

Input Impedance
Same as vertical axis.

Frequency Response
DC: DC to 1 MHz, -3 dB.
AC: 5 Hz to 1 MHz, -3 dB.

X-Y Phase Difference
3° or less at 100 kHz.

Maximum Input Voltage
Same as vertical axis.

SWEEP

Type
NORM: Triggered sweep.
AUTO: Sweep free runs in absence of trigger.

Sweep Time
0.2 µs/div to 0.5 s/div, ±3% in 20 ranges, in 1-2-5 sequence. Vernier control provides fully adjustable sweep time between steps.

Sweep Magnification
X10 (ten times), ±5%.

Linearity
±3% all ranges.
±5% on 0.2 µs/div range at X10 magnification.

MODEL 1466A

TRIGGERING

Internal Sync

INT:	Triggered by vertical input signal.
LINE:	Triggered by line voltage.

External Sync

EXT:	Triggered by signal applied to EXT TRIG jack.

External Sync Input Impedance
1 MΩ ±2%, approx. 35 pF.

Maximum External Trigger Voltage
50 V (dc + ac peak).

Coupling
AC, VIDEO FRAME, VIDEO LINE.

Trigger Sensitivity

AUTO:	20 Hz to 10 MHz: 1 div internal or 0.1 V p-p external.
NORM:	5 Hz to 10 MHz: 1 div internal or 0.1 V p-p external.
VIDEO:	FRAME or LINE: 1 div internal or 0.1 V p-p external.

PROBE ADJUST VOLTAGE
0.5 V p-p ±6% square wave, positive polarity. Approx. 1 kHz.

TRACE ROTATION
Electrical, adjustable from front panel.

POWER REQUIREMENTS
100/120/220/240 VAC ±10%, 50/60 Hz, approx. 41 W.

MODEL 1476A

TRIGGERING

Internal Sync

V. MODE:	Trigger selected by vertical MODE switch.
CH 1:	Triggered by CH 1 signal.
CH 2:	Triggered by CH 2 signal.
LINE:	Triggered by line voltage.

External Sync

EXT:	Triggered by signal applied to EXT TRIG jack.

External Sync Input Impedance
1 MΩ ±2%, approx. 35 pF.

Maximum External Trigger Voltage
50 V (dc + ac peak).

Coupling
AC, VIDEO FRAME, VIDEO LINE.

Trigger Sensitivity

AUTO:	20 Hz to 10 MHz: 1 div internal or 0.1 V p-p external.
NORM:	5 Hz to 10 MHz: 1 div internal or 0.1 V p-p external.
VIDEO:	FRAME or LINE: 1 div internal or 0.1 V p-p external.

PROBE ADJUST VOLTAGE
0.5 V p-p ±6% square wave, positive polarity. Approx. 1 kHz.

TRACE ROTATION
Electrical, adjustable from front panel.

POWER REQUIREMENTS
100/120/220/240 VAC ±10%, 50/60 Hz, approx. 41 W.

MODEL 1522

TRIGGERING

Internal Sync

V. MODE:	Trigger selected by vertical MODE switch.
CH 1:	Triggered by CH 1 signal.
CH 2:	Triggered by CH 2 signal.
LINE:	Triggered by line voltage.

External Sync

EXT:	Triggered by signal applied to EXT TRIG jack.

External Sync Input Impedance
1 MΩ ±2%, approx. 32 pF.

Maximum External Trigger Voltage
50 V (dc + ac peak).

Coupling
AC, VIDEO FRAME, VIDEO LINE.

Trigger Sensitivity

AUTO:	20 Hz to 20 MHz: 1 div internal or 0.1 V p-p external.
NORM:	5 Hz to 20 MHz: 1 div internal or 0.1 V p-p external.
VIDEO:	FRAME or LINE: 1 div internal or 0.1 V p-p external.

PROBE ADJUST VOLTAGE
0.5 V p-p ±6% square wave, positive polarity. Approx. 1 kHz.

TRACE ROTATION
Electrical, adjustable from front panel.

POWER REQUIREMENTS
100/120/220/240 VAC ±10%, 50/60 Hz, approx. 41 W.

MODEL 1466A

INTENSITY MODULATION

Sensitivity
TTL compatible. Positive voltage increases brightness, negative voltage decreases brightness.

Input Impedance
Approx. 10 kΩ.

Usable Frequency Range
DC to 1 MHz.

Maximum Input Voltage
50 V (dc + ac peak).

DIMENSIONS (WxHxD)
10-1/4 x 6-3/8 x 15-3/4" (260 x 160 x 400 mm).
10-1/4 x 7-1/8 x 18-1/8" (260 x 180 x 460 mm) including all projections.

WEIGHT
Approx. 18 lb (8.1 kg).

ENVIRONMENTAL

Within Specifications
0° to +40° C, 85% max. relative humidity.

Full Operation
0° to +50° C, 90% max. relative humidity.

MODEL 1476A

INTENSITY MODULATION

Sensitivity
TTL compatible. Positive voltage increases brightness, negative voltage decreases brightness.

Input Impedance
Approx. 10 kΩ.

Usable Frequency Range
DC to 1 MHz.

Maximum Input Voltage
50 V (dc + ac peak).

DIMENSIONS (WxHxD)
10-1/4 x 6-3/8 x 15-3/4" (260 x 160 x 400 mm).
10-1/4 x 7-1/8 x 18-1/8" (260 x 180 x 460 mm) including all projections.

WEIGHT
Approx. 18-1/2 lb (8.4 kg).

ENVIRONMENTAL

Within Specifications
0° to +40° C, 85% max. relative humidity.

Full Operation
0° to +50° C, 90% max. relative humidity.

MODEL 1522

INTENSITY MODULATION

Sensitivity
TTL compatible. Positive voltage increases brightness, negative voltage decreases brightness.

Input Impedance
Approx. 10 kΩ.

Usable Frequency Range
DC to 2 MHz.

Maximum Input Voltage
50 V (dc + ac peak).

DIMENSIONS (WxHxD)
10-1/4 x 6-3/8 x 15-3/4" (260 x 160 x 400 mm).
10-1/4 x 7-1/8 x 18-1/8" (260 x 180 x 460 mm) including all projections.

WEIGHT
Approx. 19-1/2 lb (8.8 kg).

ENVIRONMENTAL

Within Specifications
0° to +40° C, 85% max. relative humidity.

Full Operation
0° to +50° C, 90% max. relative humidity.

VERTICAL ATTENUATOR

The attenuators of channel 1 and channel 2 are mounted on two independent circuit board which are the same.
The vertical input signal coming to the BNC input receptacle enters a first- stage attenuator with path selected with the AC-GND-DC switch.
It then comes to one of the 1:1, 1:10, 1:100 attenuators which the vertical rotary switch selects before it enters the attenuator of the second stage. This attenuator consists of U1 and U2 and provides an attenuation sequence of 1-2-5.
For the ranges of 1, 2, and 5mV/div, an amplifier consists of U3 and Q2 - 4 is used. For the adjustment of step ATT balance, VR2 is used in the ranges of 10 mV/div or more. For the ranges of 1, 2, 5mV/div, VR3 adjusts coarsely and VR4 does finely. VR2 and VR4 are accessible from the outside.
Trimmer TC 5 adjusts frequency response of the amplifier operating for ranges of 1, 2, and 5mV/div. It should be adjusted to obtain square wave and frequency response of the 10 mV/div range also in the other three ranges.

VERTICAL AMPLIFIER

The signal which has passed the attenuators comes to a preamplifier consisting of U1 and Q2 - 4 (CH2 ; U101 and Q102 - 104). Variable resistor VR1 (101) provided for the preamplifier allows to vary vertical position.
The preamplifier output comes to not only the vertical mode selector but in CH1, the CH1 OUTPUT circuit consiting of Q6 - 8 from which it is sent to the outside via a 22 μF capacitor for AC coupling (1522 only).
Another component of the preamplifier output comes to the base of Q5 (105) and after being selected with the TRIG SOURCE switch, passes through the emitter follower Q5 (105) over to a trigger amplifier which generates a trigger signal from the input. The channel 2 signal is used also as X-signal and VR102 adjusts offset for X POSITION centering.
The vertical mode switching circuit is a cascode amplifier comprising Q9 - 12 (107 - 110) whose outputs to Q13, 14 are controlled by two signals, CH1 - ENABLE and CH2 ENABLE, supplied from the vertical switching signal generator of the horizontal & high voltage unit.
Channel 2 is provided with the CH2 polarity inverter which comprises Q111, 112 and switched by switch S102.
VR104 allows to center during CH2 INVERT in relation to the condition during NORMAL.
Two cascode amplifiers of channel 1 and channel 2 of the vertical mode switching circuit are provided with trimmer capacitors TC101 (102) permitting adjustment of square wave and frequency response at high frequencies and semi-fixed variable resistor VR103 permitting to adjust channel 1 gain.
Since both channels are on during ADD, current is supplied to the vertical switching circuits from the circuits of Q113, 114 which are controlled by CH1-E and CH2-E signals. The vertical switching output is given not only to the vertical output amplifier but also to the base of Q115 from which it goes as the V MODE trigger signal to the trigger amplifier.
The output amplifier is a cascode amplifier comprising Q15 - 18 and provided with VR4 permitting CRT center adjustment, VR3 permitting operating level adjustment, VR5 permitting gain adjustment, and VR6 plus TC1, 2 permitting square wave and frequency response adjustment.

TRIGGER AND SWEEP CIRCUITS

The trigger (or X-axis) signal coming from the vertical amplifier enters the trigger amplifier of Q101 - 104 with path selected by the TRIG SOURCE switch. During X-Y mode, the channel 2 signal passes Q117 to the horizontal output amplifier comprising Q118 and Q120 - 127.
During sweep mode, the trigger signal entering the trigger amplifier divides into AC and VIDEO signals. The VIDEO signal passes the video-sync signal separator which separates vertical and horizontal sync signals from the video signal. Then it comes to the TRIG COUPLING switch and appears, after shaped by a Schmitt circuit, as the clock signal of sweep control gate U102b.
The auto-sweep circuit comprising U101a, b, d and U103a checks for the presence of the output of U101c and performs free-run operation if the signal is absent and mode is AUTO.
The output of the sweep control gate is controlled by the auto sweep and Schmitt circuits. When Q116 turns off, the Miller integrator starts to charge at the speed which time-base C and R determine. SWEEP VARIABLE VR103 permits to vary sweep speed. The sweep stop circuit of Q113, 114 detects the output voltage of the Miller integrator and controls a gate to invert state and stop sweep. The holdoff circuit Q119 determines when to stop sweep.
The sawtooth wave output of the Miller integrator is with sweep speed controlled by VR104, sent to the horizontal output amplifier.
VR111 and TC101 permit sweep time adjustment respectively of 10 msec/div and 50 μsec/div ranges. VR106, 107 permit adjustment respectively of gain and center during × 10MAG mode. VR105 adjusts X-axis gain during X-Y mode.

CRT CIRCUIT

U104a ANDs the $\overline{Q}$ output of sweep control gate U102b with the CHOP blanking signal of U104c, d to generate the blanking signal.

Its amplitude is controlled in Q128, 129 by voltage coming from the INTENSITY control before the signal is sent to the blanking amplifier of Q1, 2. After amplified in the blanking amplifier and high acceleration DC component regenerated by D4 - 7, the blanking signal applies to a grid of the CRT. High voltages of 6 kV (for 1476A, 2 kV) needed for trace in the CRT are generated by the DC - DC converter comprising T1 and Q3. Operational amplifier U1b performs feedback to obtain high stability.

POWER SUPPLY

The regulated power supply requires no adjustment. +5, −15, and +15 V are generated by 3-terminal regulators. +100 and +140 V are stabilized against line voltage fluctuation by feedback applied by an operational amplifier.

CALIBRATION VOLTAGE

No adjustment is needed for the calibration voltage. An oscillator composed of operational amplifier U1 generates a stable signal.

** = omitted in Model 1476A

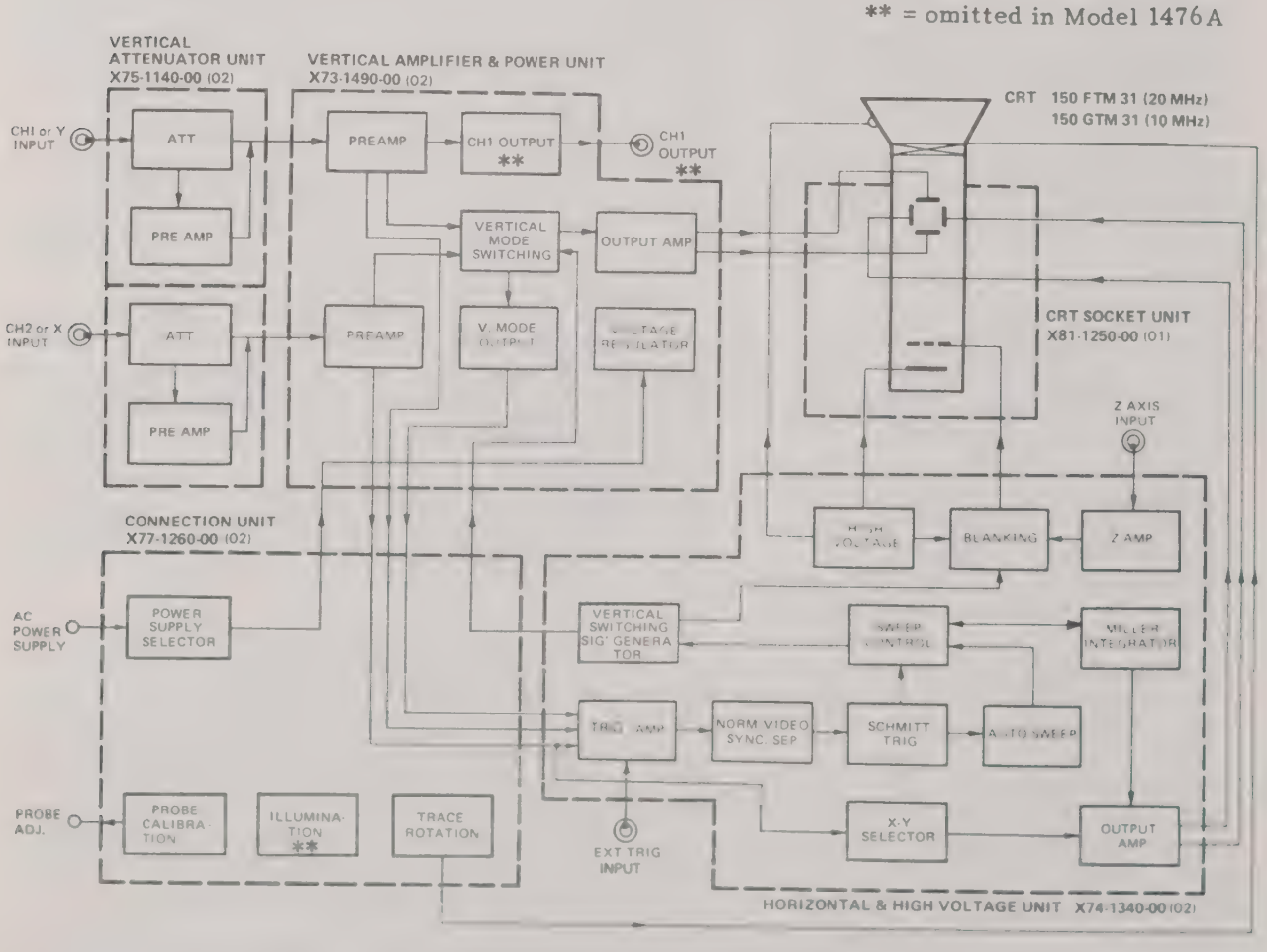


Fig. 4. Block Diagram, Model 1476A and 1522.

VERTICAL ATTENUATOR

The vertical input signal coming to the BNC input receptacle enters a first- stage attenuator with path selected with the AG-GND-DC switch.

It then comes to one of the 1:1, 1:10, 1:100 attenuators which the vertical rotary switch selects before it enters the attenuator of the second stage. This attenuator consists of U1 and U2 and provides an attenuation sequence of 1-2-5. For the ranges of 1, 2, and 5 mV/div, an amplifier consists of U3 and Q2 - 4 is used.

For the adjustment of step ATT balance, VR2 is used in the ranges of 10 mV/div or more. For the ranges of 1, 2, 5 mV/div, VR3 adjusts coarsely and VR 4 does finely. VR2 and VR4 are accessible from the outside.

Trimmer TC 5 adjusts frequency response of the amplifier operating for ranges of 1, 2, and 5 mV/div. It should be adjusted to obtain square wave and frequency response of the 10 mV/div range also in the other three ranges.

VERTICAL AMPLIFIER

The signal which has passed the attenuators comes to a preamplifier consisting of U1 and Q2 - 4.

Variable resistor VR1 provided for the preamplifier allows to vary vertical position.

The preamplifier output comes to the base of Q5 and after being selected with the TRIG SOURCE switch, passes through the emitter follower Q5 over to a trigger amplifier which generates a trigger signal from the input.

The second stage amplifier is a cascode amplifier comprising Q9 - 12 whose switched to differential signal and it is fed to emitter follower of Q13 and 14.

The cascode amplifier is provided with trimmer capacitor TC101 permitting adjustment of square wave and frequency response at high frequencies.

The signal from Q13 and 14 is fed to vertical output amplifier.

The output amplifier is a cascode amplifier comprising Q15 - 18 and provided with VR4 permitting CRT center adjustment, VR3 permitting operating level adjustment, VR5 permitting gain adjustment, and VR6 plus TC1, 2 permitting square wave and frequency response adjustment.

TRIGGER AND SWEEP CIRCUITS

The trigger signal coming from the vertical amplifier enters the trigger amplifier of Q101 - 104 with path selected by the TRIG SOURCE switch. During X-Y mode, the signal applied to EXT TRIG input is X-signal which passes sweep X-Y selector consisting of S106, Q117, 130 and 131 and then applies to horizontal output amplifier comprising Q118 and Q120 - 127.

VR103a of X-Y selector adjusts X-axis gain coarsely and VR110 adjusts X-axis DC balance.

During sweep mode, the sync signal entering the sync amplifier divides into AC and VIDEO signals. The VIDEO signal passes the video-sync signal separator which separated vertical and horizontal sync signals from the video signal. Then it comes to the TRIG COUPLING switch and appears, after shaped by a Schmitt circuit, as the clock signal of sweep control gate U102b.

The auto-sweep circuit comprising U101a, b, d and U103a checks for the presence of the output of U101c and performs free-run operation if the signal is absent and mode is AUTO.

The output of the sweep control gate is controlled by the auto sweep and Schmitt circuits. When Q116 turns off, the Miller integrator starts to charge at the speed which time-base C and R determine. SWEEP VARIABLE VR103b permits to vary sweep speed. The sweep stop circuit of Q113, 114 detects the output voltage of the Miller integrator and controls a gate to invert state and stop sweep. The holdoff circuit Q119 determines when to stop sweep. The sawtooth wave output of the Miller integrator is, with sweep speed controlled by VR104, sent to the horizontal output amplifier.

VR111 and TC101 permit sweep time adjustment respectively of 10 msec/div and 50 μsec/div ranges. VR106, 107 permit adjustment respectively of gain and center during $\times$10MAG mode. VR105 adjusts X-axis gain during X-Y mode.

CRT CIRCUIT

Q output of sweep control gate U102b generates the blanking signal.

Its amplitude is controlled in Q128, 129 by voltage coming from the INTENSITY control before the signal is sent to the blanking amplifier of Q1, 2.

After amplified in the blanking amplifier and high acceleration dc component of regenerated by D4-D7, the blanking signal applies to a grid of the CRT. High voltages of 2 kV needed for trace in the CRT are generated by dc-dc converter comprising T1 and Q3. Operational amplifier U1b performs feedback to obtain high stability.

POWER SUPPLY

The regulated power supply requires no adjustment. +5, −15, and +15 V are generated by 3-terminal regulators. +100 and +140 V are stabilized against line voltage fluctuation by feedback applied by an operational amplifier.

CALIBRATION VOLTAGE

No adjustment is needed for the calibration voltage. An oscillator composed of operational amplifier U1 generates a stable signal.

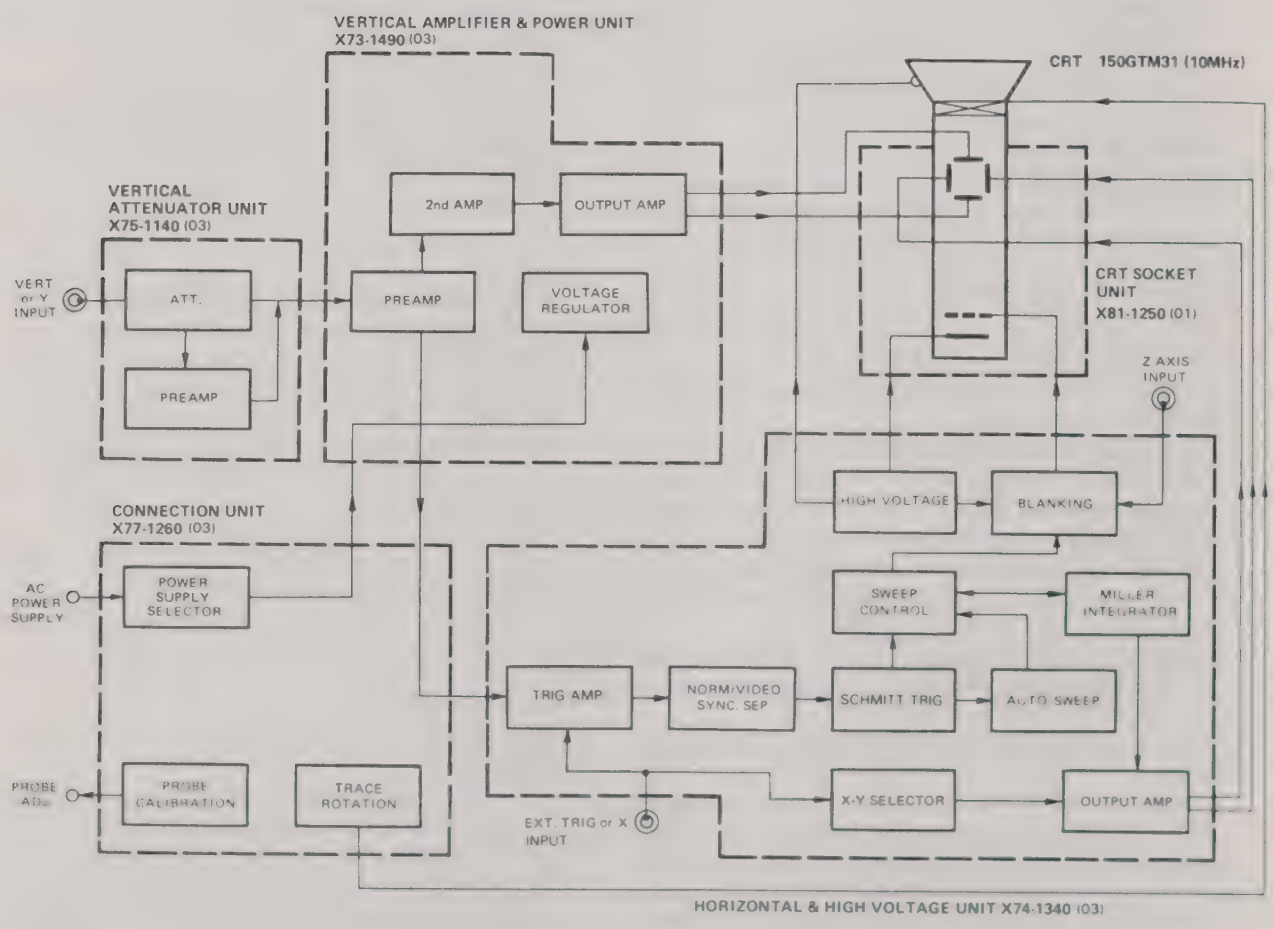


Fig. 5. Block Diagram, Model 1466A.

CALIBRATION

To obtain the best performance, periodically calibrate the unit. Sometimes, only one mode need be calibrated, while at other times, all modes should be calibrated. When one mode is calibrated, it must be noted that the other modes may be affected. When calibrating all modes, perform the calibration in the specified sequence.

The following calibration required an accurate measuring instrument and an insulated adjusting flat blade screwdriver. If they are not available, contact your dealer.

For optimum adjustment, turn the power on and warm up the this equipment sufficiently (more than 30 minutes) before starting.

Before calibrating the unit, check the power supply voltage.

TEST EQUIPMENT REQUIRED

The following instrument or their equivalent should be used for making adjustment.

Test Equipment	Minimum Specification
Digital Multi-Meter	Impedance: More than 20 MΩ, Measuring range: 0.01 V to 199 V
Sine-Wave Generator	Frequency: 10 Hz to 10 MHz, constant voltage over tuning range
Square-Wave Generator *	Output signal: 1 kHz, Amplitude: 10 mVp-p to 10 Vp-p, Accuracy: within ±1%, Rise time: 35ns or less 100 kHz, Rise time: 1 ns or less
Time-Marker Generator *	Time mark: 0.5 s to 0.1μs repetive waveform
Oscilloscope	Sensitivity: more than 5 mV Frequency response: More than 100 MHz
High-Voltage Probe	Input Impedance: 100 MΩ
Termination	Impedance: 50 Ω Accuracy: within 3%

* = or Oscilloscope Calibrator.

PREPARATION FOR ADJUSTMENT

Control Setting

The control setting listed below must be used for each adjustment procedure.

Exceptions to these settings will be noted as they occur.

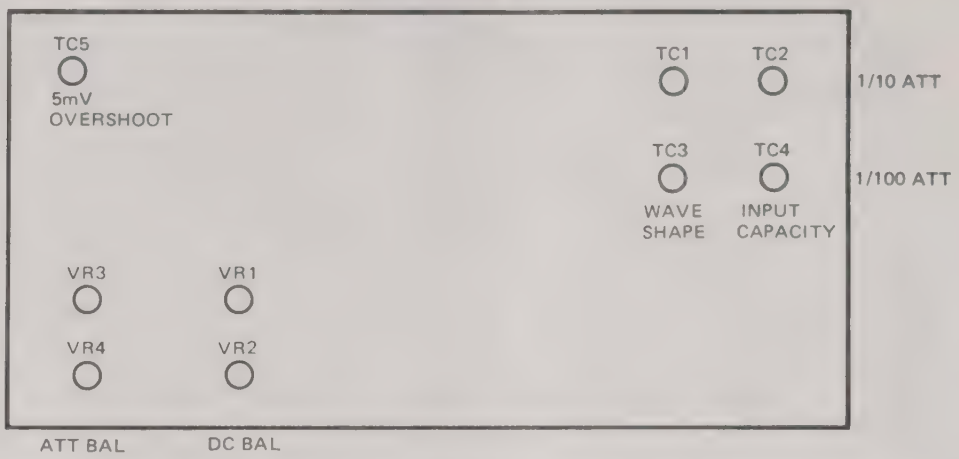
After completing a adjustment, return the controls to the following settings.

NAME OF KNOBS	POSITION
INTENSITY	3 o'clock
FOCUS	Optimum position
CH1, CH2 POSITION	Mechanical center
◄► H. POSITION/PULL ×10MAG	Mechanical center, push
VARIABLE (SWEEP TIME/DIV, VOLTS/DIV)	CAL
AC-GND-DC (CH1 and CH2)	DC (GND at no signal)
MODE	CH1
CH2 POLARITY	NORM
COUPLING	AC
SOURCE	V.MODE
TRIG. LEVEL	Mechanical center, push
TRIG. MODE	AUTO
VOLTS/DIV	10 mV/DIV
SWEEP TIME/DIV	0.2 ms/DIV

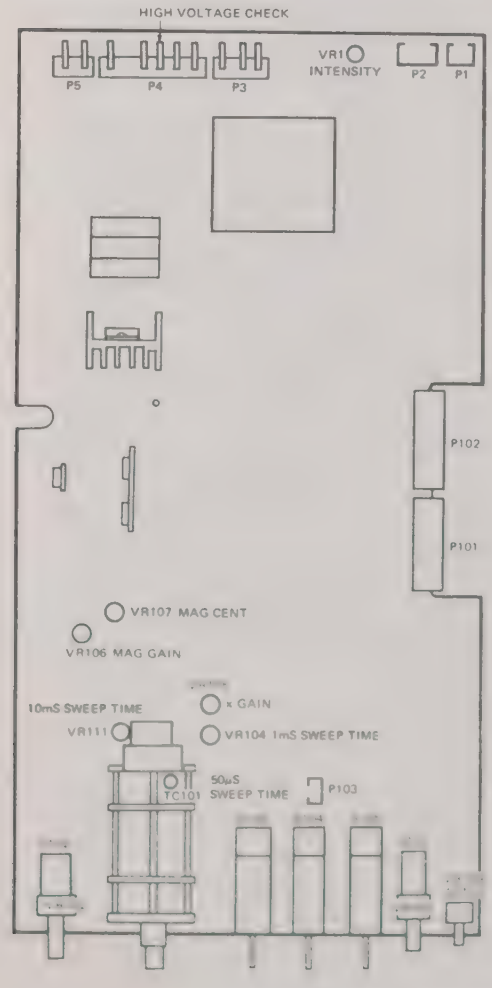
Item	Control setting	Adjustment control			P.C.B	Procedure
		1522	1476A	1466A		
POWER SUPPLY SECTION ADJ.						
ASTIG, FOCUS	TRIG MODE; X-Y	ASTIG, FOCUS				For the sharpest and roundest spot.
INTENSITY	AC-GND-DC; GND TRIG MODE; X-Y	VR1			X74	Spot disappears in 9 to 10 o'clock position.
TRACE ROTATION	AC-GND-DC; GND	TRACE ROTATION VR				Trace is in parallel with horizontal graduation line.
CRT CENTER		VR4			X73	Short the short terminal (P2). Trace should be in the CRT center.
58 V ADJ.		VR3	—	—	X73	Short the short terminal (P2). The voltage of +Y (−Y) should be 58 V±0.5 V.
63 V ADJ.		—	VR3	VR3	X73	Short the short terminal (P2). The voltage of +Y (−Y) should be 63 V±0.3 V.
VERTICAL AMPLIFIER SECTION ADJ.						
CH1 DC BAL	VOLTS/DIV; 10 mV AC-GND-DC; GND	VR2	VR2	VR2	X75	Trace does not move vertically when rotating CH1 variable control.
		—	VR1	VR1	X75	
CH2 DC BAL	VOLTS/DIV; 10 mV AC-GND-DC; GND	VR2	VR2	—	X75	Trace does not move vertically when rotating CH2 variable control.
		—	VR1	—	X75	
CH1 ATT BAL	VOLTS/DIV; 1 mV AC-GND-DC; GND	VR3	VR3	VR3	X75	Trace does not move vertically when rotating CH1 variable control.
		VR4	VR4	VR4	X75	
CH2 ATT BAL	VOLTS/DIV; 1 mV AC-GND-DC; GND	VR3	VR3	—	X75	Trace does not move vertically when rotating CH2 variable control.
		VR4	VR4	—	X75	
CH2 INVERT	MODE; CH2 AC-GND-DC; GND	VR104	VR104	—	X73	Trace should be overlapped in the center of the graduation.
CH2 GAIN	MODE; CH2 VOLTS/DIV; 10 mV	VR5	VR5	VR5 (CH1 GAIN)	X73	When applying a 1 kHz, 50 mVp-p square wave signal, vertical amplitude should be 5 div.
CH1 GAIN	MODE; CH1 VOLTS/DIV; 10 mV	VR103	VR103	—	X73	When applying a 1 kHz, 50 mVp-p square wave signal, vertical amplitude should be 5 div.
CH1 WAVESHAPE		TC1	TC1	TC1	X75	Same as 10 mV range, a best flat top waveform should be obtained. TC1.....0.1 V TC3.....1 V
		TC3	TC3	TC3	X75	
CH2 WAVESHAPE		TC1	TC1	—	X75	Same as 10 mV range, a best flat top waveform should be obtained. TC1.....0.1 V TC3.....1 V
		TC3	TC3	—	X75	
CH2 INPUT CAPACI TANCE		TC2	TC2	—	X75	Input capacitance should be same as 10 mV/div. TC2.....0.1 V TC4.....1 V
		TC4	TC4	—	X75	
CH2 INPUT CAPACI-TANCE		TC2	TC2	TC2	X75	Input capacitance should be same as 10 mV/div. TC2.....0.1 V TC4.....1 V
		TC4	TC4	TC4	X75	

Item	Control setting	Adjustment control			P.C.B	Procedure
		1522	1476A	1466A		
CH1 OVERSHOOT	SWEEP TIME/DIV; 2 μs PULL×10MAG; PULL VOLTS/DIV; 10 mV	TC101	TC101	TC101	X73	When applying a 1 kHz, square wave signal, vertical amplitude should be 6 div. Set TC101 at mechanical center and with VR6, for the sharpest waveform. TC1...mid range flat top waveform TC2...high range flat top waveform Set VOLTS/DIV to 5 mV for 6 div ± 3% vertical amplitude waveform. Overshoot should be ± 3%. TC5...best flat top waveform.
		VR6	VR6	VR6	X73	
		TC1	TC1	TC1	X73	
		TC2	TC2	TC2	X73	
		TC5	TC5	TC5	X75	
CH2 OVERSHOOT	SWEEP TIME/DIV; 2 μs	TC102	TC102	—	X73	When applying a 1 kHz square wave signal for 6 div vertical amplitude, overshoot should be ± 3%.
HORIZONTAL HIGH VOLTAGE SECTION ADJ.						
1 ms SWEEP TIME	SWEEP TIME/DIV; 1 ms	VR104	VR104	VR104	X74	Pulse should be on each division on the graduation line.
MAG GAIN	SWEEP TIME/DIV; 1 ms PULL×10MAG; PULL	VR106	VR106	VR106	X74	Interval of pulses should be 10 div when applying a 1 ms time marker signal.
MAG CENTER	SWEEP TIME/DIV; 1 ms PULL×10MAG; PUSH	VR107	VR107	VR107	X74	The center of pulse should be center of the graduation scale when applying a 5 ms marker signal. H.POSITION...mechanical center.
10 ms SWEEP TIME	SWEEP TIME/DIV; 10 ms	VR111	VR111	VR111	X74	11th pulse should correspond to the right end of the graduation line.
20 μs SWEEP TIME	SWEEP TIME/DIV; 20 μs	TC101	TC101	TC101	X74	11th pulse should correspond to the right end of the graduation line.
X POSITION	TRIG MODE; X-Y➡AUTO AC-GND-DC; GND	VR102	VR102	—	X73	(1) Adjust the trace for center graduation line. (2) Spot should be the center of the screen.
X GAIN	TRIG MODE; X-Y VOLTS/DIV; 10 mV (CH2)	VR105	VR105	VR105	X74	When applying a 1 kHz, 50 mV square wave signal, horizontal amplitude should be 5 div.

VERTICAL ATTENUATOR UNIT (X75-1140)



HORIZONTAL & HIGH VOLTAGE UNIT (X74-1340)



VERTICAL AMPLIFIER & POWER UNIT (X73-1490)

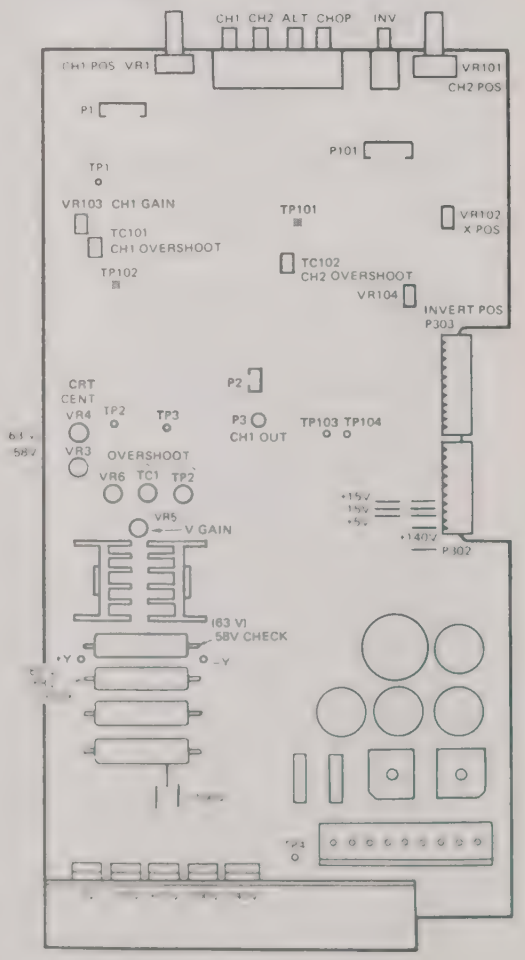
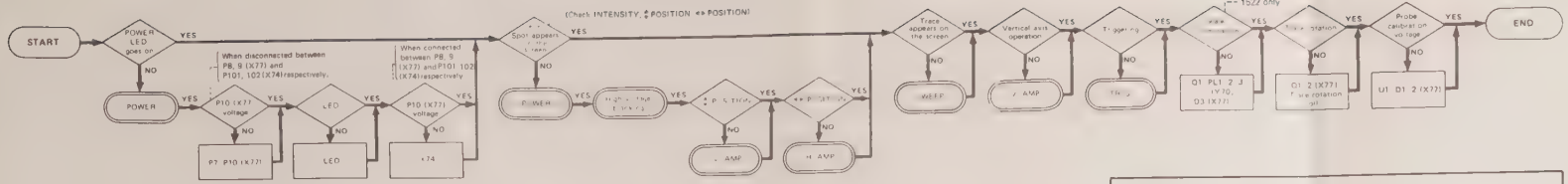
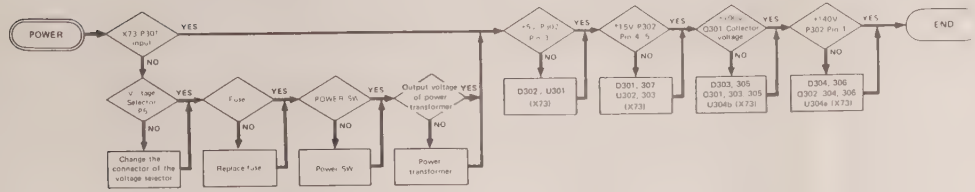
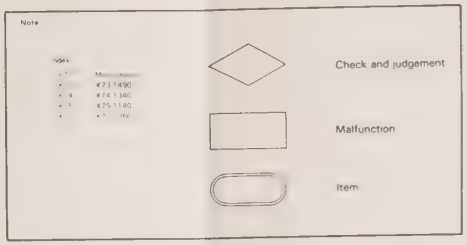
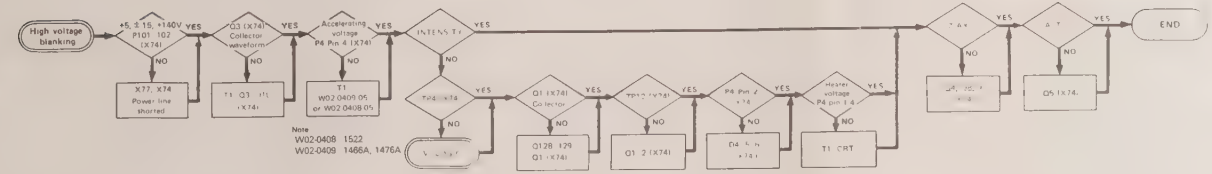


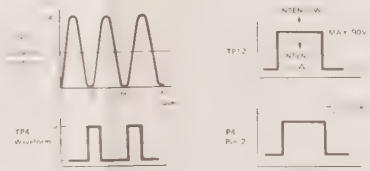
Fig. 6. Location of Calibration Adjustments.

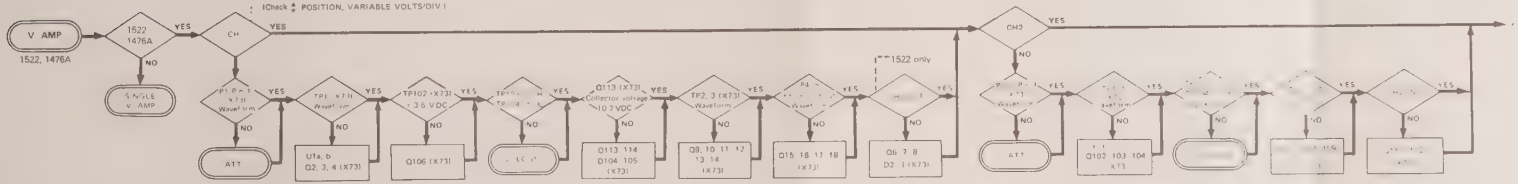




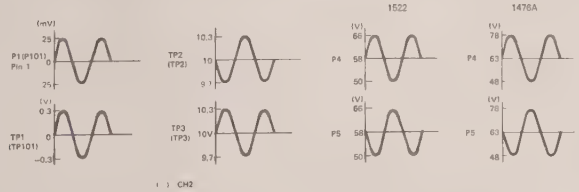


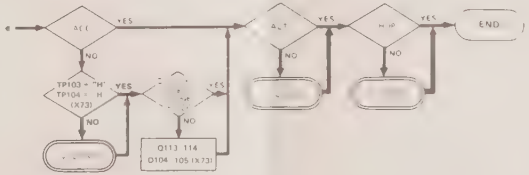


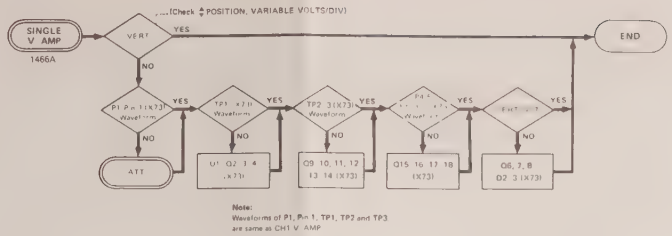


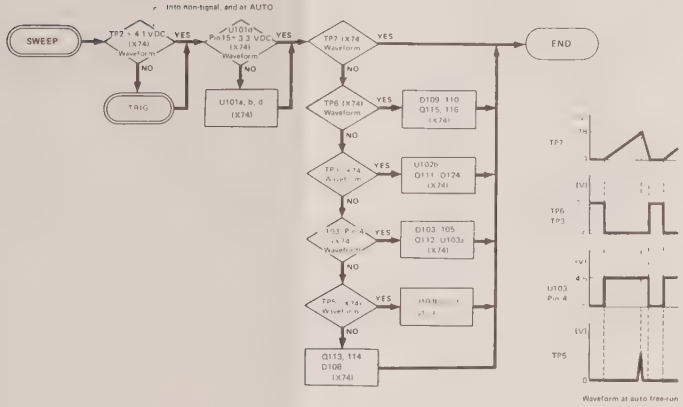


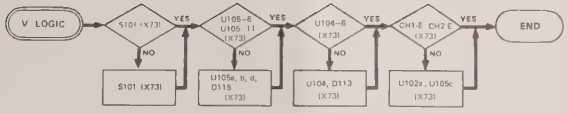
Condition
Apply a sine wave signal to X input for 6 div vertical amplitude

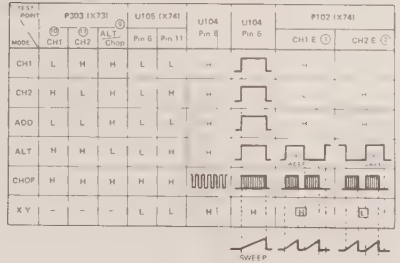


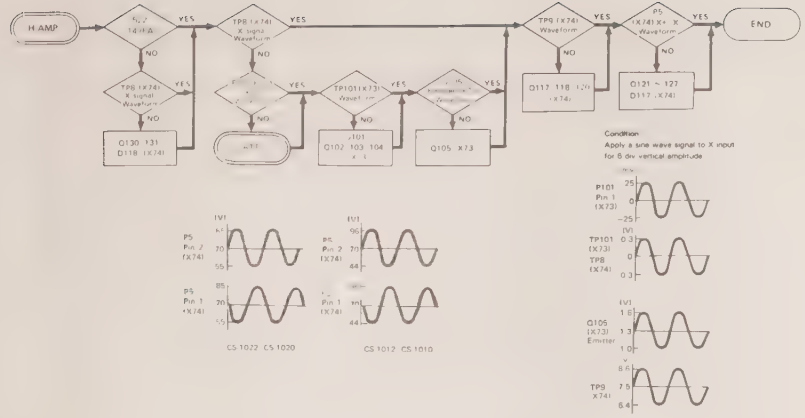


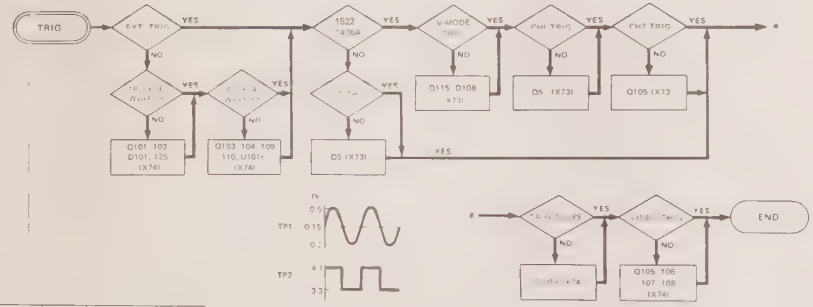

SINGLE V AMP
1466A
VERT
(Check ↕POSITION, VARIABLE VOLTS/DIV)
YES
NO
END
ATT
Note:
Waveforms of P1, Pin 1, TP1, TP2 and TP3 are same as CH1 V AMP

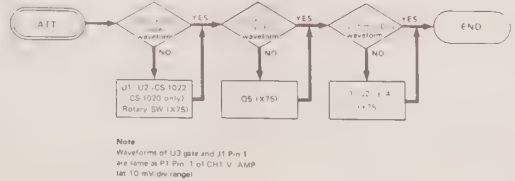

SWEEP
TRIG
END
YES
NO
Waveform at auto free-run


V LOGIC
END
YES
NO
Note: Check the signal refer to table right.


MODE
CH1
CH2
ADD
ALT
CHOP
X-Y
SWEEP


H AMP
END
YES
NO
Condition
Apply a sine wave signal to X input for 6 div vertical amplitude
CS 1022 CS 1020
CS 1012 CS 1010


TRIG
END
YES
NO
Waveform which synchronized at the center of the signal when applied a sine wave signal for 6 div


ATT
END
YES
NO
Note
Waveforms of U3 gate and J1 Pin 1 are same as P1 Pin 1 of CH1 V AMP for 10 mV div range

ELECTRICAL PARTS LIST

PARTS ORDERING INFORMATION

There is a minimum charge for each invoice. Orders will be shipped C.O.D. unless previous open account arrangements have been made or remittance accompanies order. Advance remittance must cover handling, postage, or express charges. Specify model and serial number when ordering replacement parts.

ORDER REPLACEMENT PARTS FROM:

B & K-Precision, Dynascan Corporation
Factory Service Operations
4050 North Ravenswood Avenue
Chicago, Illinois 60613

SCHEMATIC SYMBOL	DESCRIPTION	DYNASCAN PART NO.
**********		
	VERTICAL ATTENUATOR (X75-1140)	
**********		
	RESISTORS	
	Unlisted resistors are ±5%, 1/4 W.	
	See schematic diagram for value.	
R5	900 kΩ ±1%, 1/4 W Metal Film ..	013-012-9-013
R6	111 kΩ ±1%,1/4 W Metal Film ...	013-034-9-036
R8	990 kΩ ±1%,1/4 W Metal Film ...	013-012-9-014
R9	10.1 kΩ ±1%, 1/4 W Metal Film ..	013-034-9-035
R11	1 MΩ ±1%, 1/4 W Metal Film	015-144-1-004
R13 *	390 Ω ±1%, 1/4 W Metal Film ...	015-076-9-001
R13 #	27.0 Ω ±1%, 1/4 W Metal Film ...	013-077-9-001
R15 *	390 Ω ±1%, 1/4 W Metal Film ...	015-076-9-001
R15 #	27.0 Ω ±1%, 1/4 W Metal Film ...	013-077-9-001
R33	910 Ω ±1%, 1/4 W Metal Film ...	013-076-9-002
R34	100 Ω ±1%, 1/4 W Metal Film ...	015-144-1-000
R36	300 Ω ±1%, 1/4 W Metal Film ...	013-076-9-003
R37	180 Ω ±1%, 1/4 W Metal Film ...	013-076-9-004
R38	120 Ω ±1%, 1/4 W Metal Film ...	013-010-9-001
R41	300 Ω ±1%, 1/4 W Metal Film ...	013-076-9-003
R42	180 Ω ±1%, 1/4 W Metal Film ...	013-076-9-004
R43	120 Ω ±1%, 1/4 W Metal Film ...	013-010-9-001
VR1	33 kΩ Trimpot	008-341-9-008
VR2 #	33 kΩ Trimpot	008-341-9-008
VR3	33 kΩ Trimpot	008-341-9-008
VR4	33 kΩ Trimpot	008-341-9-008
VR5	Part of S2	
	CAPACITORS	
C1	0.047 µF ±10%, 630 V, Metal Film	033-023-9-001
C2	47 pF ±5%, 100 V, Mica	023-056-9-002
C3	470 pF ±5%, 100 V, Mica	023-056-9-003
C4	0.01 µF ±20%, 630 V, Metal Film.	033-023-9-002
C5 *	0.01 µF ±10%, 50 V, Ceramic	020-296-9-001
C5 #	Not Used.	
C6	0.5 pF ±0.25 pF, 50 V, Ceramic..	020-283-9-007
C7	Not Used.	
C8 *	Not Used	
C8 #	4 pF ±0.25 pF,50 V, Ceramic	020-328-9-002
C9 *	47 pF ±5%, 50 V, Ceramic	020-149-9-006
C9 #	68 pF ±5%, 50 V, Ceramic	020-215-9-008
C10-12	0.01 µF ±10%, 50 V, Ceramic	020-296-9-001
C13-16	47 µF ±20%, 25 V, Electrolytic ..	022-226-9-001
C17 *	3 pF ±0.25 pF, 50 V, Ceramic ...	020-233-9-001
C17 #	27 pF ±5%, 50 V, Ceramic	020-326-9-007
C18 *	1 pF ±0.25 pF, 50 V, Ceramic ...	020-250-9-001
C18 **	2 pF ±0.25 pF, 50 V, Ceramic ...	020-234-9-003
C19 *	1 µF ±20%, 50 V, Electrolytic ...	022-167-9-001
C20 *	1500 pF ±10%, 50 V, Ceramic ...	020-296-9-003
C21	Not Used	
C22 *	0.01 µF ±10%, 50 V, Ceramic	020-296-9-001
TC1	10 pF Trimmer Capacitor	028-073-9-001
TC2	20 pF Trimmer Capacitor	028-073-9-002
TC3	10 pF Trimmer Capacitor	028-073-9-001
TC4	20 pF Trimmer Capacitor	028-073-9-002
TC5	10 pF Trimmer Capacitor	028-073-9-001
	DIODES	
D1, 2	WZ-090 Zener Diode, 9.0 V	152-069-9-002
	TRANSISTORS	
Q1	2SK30A(O) FET, N-Channel.....	182-026-9-001
Q2, 3	2SA1005(K) PNP Transistor.....	177-063-9-001
Q4	2SC2786(K) NPN Transistor.....	176-147-9-001
Q5 *	2SC2786(K) NPN Transistor.....	176-147-9-001
U1	M47F (C) Dual FET.....	182-071-9-001
U2 *	2SA884 Dual PNP Transistor	177-063-9-002
U3	M47F (B) Dual FET	182-072-9-001
	SWITCHES	
S1	Slide Switch, 3-position, AC-GND-DC	080-003-9-001
S2	Rotary Switch, 12-position, With 500 Ω Potentiometer, VOLTS/DIV and VARIABLE	083-293-9-001
	MISCELLANEOUS	
	BNC Receptacle	773-090-9-001

CODE: * = Model 1522 only, ** = Model 1476A only, *** = Model 1466A only,
= Model 1466A and 1476A, ## = Model 1476A and 1522.

SCHEMATIC SYMBOL	DESCRIPTION	DYNASCAN PART NO.

* *

VERTICAL AMPLIFIER & POWER UNIT (X73-1490)

* *

RESISTORS

Unlisted resistors are ±5%, 1/4 W.
See schematic diagram for value.

R14	100 Ω ±1%, 1/4 W Metal Film	015-144-9-000
R15 *	1.3 kΩ ±1%, 1/4 W Metal Film	015-144-1-301
R15 #	1.2 kΩ ±1%, 1/4 W Metal Film	013-076-9-017
R36, 37	2.2 kΩ ±1%, 1/4 W Metal Film	013-013-9-009
R44-47	820 Ω ±1%, 1/4 W Metal Film	013-010-9-004
R60-63	680 Ω ±5%, 3 W Metal Film	011-003-5-681
R114 ##	100 Ω ±1%, 1/4 W Metal Film	015-144-1-000
R116 *	1.3 kΩ ±1%, 1/4 W Metal Film	015-144-1-301
R116 **	1.2 kΩ ±1%, 1/4 W Metal Film	013-076-9-017
R129 ##	2.2 kΩ ±1%, 1/4 W Metal Film	013-013-9-009
R130 ##	2.2 kΩ ±1%, 1/4 W Metal Film	013-013-9-009
R132 ##	2 kΩ ±1%, 1/4 W Metal Film	015-144-2-001
R133 ##	2 kΩ ±1%, 1/4 W Metal Film	015-144-2-001
R309	15 kΩ ±1%, 1/4 W Metal Film	015-144-1-502
R310	100 kΩ ±1%, 1/4 W Metal Film	015-144-1-003
R311	16 kΩ ±1%, 1/4 W Metal Film	013-076-9-005
R312	150 kΩ ±1%, 1/4 W Metal Film	015-144-1-503
R313	100 kΩ ±5%, 1/2 W Carbon	002-102-5-104
R314	100 kΩ ±5%, 1/2 W Carbon	002-102-5-104
VR1	10 kΩ Potentiometer, CH 1 POSITION Control	008-467-9-003
VR2	Not Used	
VR3	200 Ω Trimpot	008-434-9-001
VR4-6	100 Ω Trimpot	008-434-9-002
VR101 ##	10 kΩ Potentiometer, CH 2 POSITION Control	008-467-9-003
VR102 ##	20 kΩ Trimpot	008-467-9-004
VR103 ##	100 Ω Trimpot	008-434-9-004
VR104 ##	500 Ω Trimpot	008-467-9-005

CAPACITORS

C1	Not Used	
C2	5 pF ±0.25 pF, 50 V, Ceramic	020-233-9-002
C3-6	Not Used	
C7	0.01 µF ±10%, 50 V, Ceramic	020-296-9-001
C8-11	47 µF ±20%, 25 V, Electrolytic	022-226-9-001
C12	Not Used	
C13	47 pF ±5%, 50 V, Ceramic	020-149-9-006
C14	22 µF ±20%, 25 V, Electrolytic	022-264-9-001
C15	Not Used	
C16	22 µF ±20%, 25 V, Electrolytic	022-264-9-001
C17 *	22 µF ±20%, 25 V, Electrolytic	022-264-9-002
C101	Not Used	
C102 *	1 pF ±0.25 pF, 50 V, Ceramic	020-250-9-001
C102 **	5 pF ±0.25 pF, 50 V, Ceramic	020-033-9-002
C103	Not Used	
C104 ##	47 µF ±20%, 25 V, Electrolytic	022-226-9-001
C105 ##	47 µF ±20%, 25 V, Electrolytic	022-226-9-001
C106 ##	47 µF ±20%, 25 V, Electrolytic	022-226-9-001
C107 ##	47 µF ±20%, 25 V, Electrolytic	022-226-9-001
C108	Not Used	
C109 ##	47 pF ±5%, 50 V, Ceramic	020-149-9-006
C110 ##	47 pF ±5%, 50 V, Ceramic	020-149-9-006
C111 ##	1 µF ±20%, 50 V, Electrolytic	022-167-9-001
C112 ##	0.01 µF ±10%, 50 V, Ceramic	020-296-9-001
C301	2200 µF ±20%, 35 V, Electrolytic	022-264-9-003
C302	2200 µF ±20%, 35 V, Electrolytic	022-264-9-003
C303	2200 µF ±20%, 25 V, Electrolytic	022-264-9-004
C304	100 µF ±20%, 200 V, Electrolytic	033-071-9-001
C305	47 µF ±20%, 250 V, Electrolytic	021-073-9-001
C306	100 µF ±20%, 10 V, Electrolytic	022-226-9-013
C307	100 µF ±20%, 25 V, Electrolytic	022-226-9-002
C308	100 µF ±20%, 25 V, Electrolytic	022-226-9-002
C309	10 µF ±20%, 160 V, Electrolytic	021-073-9-002
C310	1 µF ±20%, 250 V, Electrolytic	021-073-9-003
C311	1 µF ±20%, 50 V, Electrolytic	022-167-9-001
C312	1 µF ±20%, 50 V, Electrolytic	022-226-9-017
C313	0.01 µF ±10%, 50 V, Ceramic	020-296-9-001
C314	1 µF ±20%, 50 V, Electrolytic	022-226-9-017
C315	0.01 µF ±10%, 50 V, Ceramic	020-296-9-001
C316	1 µF ±20%, 50 V, Electrolytic	022-226-9-017
C317	0.01 µF ±10%, 50 V, Ceramic	020-296-9-001
C318	1000 pF ±10%, 50 V, Ceramic	020-296-9-002
C319	1000 pF ±10%, 50 V, Ceramic	020-296-9-002
C320	0.01 µF ±10%, 500 V, Ceramic	020-296-9-007
TC1, 2	70 pF Trimmer	028-073-9-003
TC101	20 pF Trimmer	028-073-9-004
TC102 ##	20 pF Trimmer	028-073-9-004

DIODES

D1-3	DS442X Silicon Switching Diode	151-097-9-001
D101 ##	DS442X Silicon Switching Diode	151-097-9-001
D102 ##	DS442X Silicon Switching Diode	151-097-9-001
D103 ##	DS442X Silicon Switching Diode	151-097-9-001
D104 ##	DS442X Silicon Switching Diode	151-097-9-001
D105 ##	DS442X Silicon Switching Diode	151-097-9-001
D106 ##	DS442X Silicon Switching Diode	151-097-9-001
D107 ##	DS442X Silicon Switching Diode	151-097-9-001
D301	S2VB40F Bridge Rectifier	157-010-9-001
D302	S2VB40F Bridge Rectifier	157-010-9-001
D303	S1QB60 Bridge Rectifier	157-006-9-001
D304	S1QB60 Bridge Rectifier	157-006-9-001
D305	DS442X Silicon Switching Diode	151-097-9-001
D306	DS442X Silicon Switching Diode	151-097-9-001
D307	V06B Silicon HV Diode	151-071-9-001

TRANSISTORS

Q1	Not Used	
Q2, 3	2SA1005(K) PNP Transistor	177-063-9-001
Q4	2SC2786(K) NPN Transistor	176-147-9-001
Q5 *	2SC2786(K) NPN Transistor	176-147-9-001
Q5 #	2SC2785(K) NPN Transistor	176-147-9-002
Q6-7 *	2SC2786(K) NPN Transistor	176-147-9-001
Q8 *	2SA1005(K) PNP Transistor	177-063-9-001
Q9-14 *	2SC2786(K) NPN Transistor	176-147-9-001
Q9-14 #	2SC2785(K) NPN Transistor	176-147-9-002
Q15 *	2SC2407 NPN Transistor	176-099-9-003
Q15 #	2SC1973 NPN Transistor	176-073-9-003
Q16 *	2SC2407 NPN Transistor	176-099-9-003
Q16 #	2SC1973 NPN Transistor	176-073-9-003
Q17, 18	2SC2912(R,S) NPN Silicon Power Transistor	172-066-9-001
Q102 ##	2SA1005(K) PNP Transistor	177-063-9-001
Q103 ##	2SA1005(K) PNP Transistor	177-063-9-001
Q104 ##	2SC2986(K) NPN Transistor	176-147-9-001
Q105 *	2SC2786(K) NPN Transistor	176-147-9-001
Q105 **	2SC2785(K) NPN Transistor	176-147-9-002
Q106 ##	2SC2785(F) NPN Transistor	176-147-9-002
Q107-112 *	2SC2786(K) NPN Transistor	176-147-9-001
Q107-112 **	2SC2785(K) NPN Transistor	176-147-9-002
Q113 ##	2SA1175(F) PNP Transistor	177-063-9-003

CODE: * = Model 1522 only, ** = Model 1476A only, *** = Model 1466A only,
= Model 1466A and 1476A, ## = Model 1476A and 1522.

SCHEMATIC SYMBOL	DESCRIPTION	DYNASCAN PART NO.
	VERTICAL AMPLIFIER & POWER UNIT (X73-1490) continued	
Q114 ##	2SC2785(F) NPN Transistor	176-147-9-002
Q115 *	2SC2786(K) NPN Transistor	176-147-9-001
Q115 **	2SC2785(K) NPN Transistor	176-147-9-002
Q301	2SA1009(L,K) PNP Silicon Power Transistor	173-014-9-001
Q302	2SA1009(L,K) PNP Silicon Power Transistor	173-014-9-001
Q303	2SA1175(F) PNP Transistor	177-063-9-003
Q304	2SA1175(F) PNP Transistor	177-063-9-003
Q305	2SC2271(E) NPN Transistor	176-147-9-003
Q306	2SC2271(E) NPN Transistor	176-147-9-003
U1	M47F(B) Dual FET	182-072-9-001
U101 ##	M47F(B) Dual FET	182-072-9-001
	INTEGRATED CIRCUITS	
U301	UPC7805H, 5 V Regulator	307-336-9-001
U302	UPC7915HA, -15 V Regulator	307-336-9-002
U303	NJM7815, +15 V Regulator	307-336-9-003
U304	NJM4558D, Dual Op-Amp	307-139-9-004
	SWITCHES	
S101/ 102 ##	5-Station Pushbutton Switch Assembly, MODE Switch	088-104-9-001
	MISCELLANEOUS	
L1, 2	1 mH Ferri-Inductor	041-141-9-002
P3 *	BNC Receptacle, CH 1 OUT Jack	773-127-9-001
	HORIZONTAL & HIGH VOLTAGE UNIT (X74-1340)	
	RESISTORS	
	Unlisted resistors are ±5%, 1/4 W. See schematic diagram for value.	
R1	4.7 kΩ ±1%, 1/4 W Metal Film	013-061-9-001
R5	47 kΩ ±1%, 1/4 W Metal Film	013-076-9-008
R7 *	330 kΩ ±1%, 1/4 W Metal Film	013-076-9-009
R7 #	240 kΩ ±1%, 1/4 W Metal Film	013-077-9-002
R13	33 MΩ, Metal Film	004-204-9-001
R15	47 MΩ, Metal Film	004-204-9-002
R16 *	4.7 MΩ, Metal Film	004-204-9-003
R16 #	3.3 MΩ, Metal Film	004-205-9-001
R17 *	10 MΩ, Metal Film	004-204-9-004
R17 #	22 MΩ, Metal Film	004-205-9-002
R24	680 Ω ±1%, 1/4 W Metal Film	013-010-9-018
R25	24 kΩ ±1%, 1/4 W Metal Film	013-076-9-010
R26	13 kΩ ±1%, 1/4 W Metal Film	015-144-1-302
R101	1 MΩ ±1%, 1/4 W Metal Film	015-144-1-004
R107	3.3 kΩ ±1%, 1/4 W Metal Film	013-013-9-011
R108	330 Ω ±1%, 1/4 W Metal Film	013-076-9-011
R109	360 Ω ±1%, 1/4 W Metal Film	013-076-9-012
R110	4.7 kΩ ±1%, 1/4 W Metal Film	013-061-9-001
R111	5.1 kΩ ±1%, 1/4 W Metal Film	013-034-9-041
R122	2.7 kΩ ±1%, 1/4 W Metal Film	013-034-9-039
R123	360 Ω ±1%, 1/4 W Metal Film	013-076-9-012
R124	360 Ω ±1%, 1/4 W Metal Film	013-076-9-012
R126	1.8 kΩ ±1%, 1/4 W Metal Film	013-076-9-013
R127	2.7 kΩ ±1%, 1/4 W Metal Film	013-034-9-039
R147	33 kΩ ±1%, 1/4 W Metal Film	013-076-9-014
R149	39 kΩ ±1%, 1/4 W Metal Film	013-076-9-015
R150	18 kΩ ±5%, 2 W, Metal Film	011-002-5-183
R156	1.2 kΩ ±1%, 1/4 W Metal Film	013-076-9-017
R157	1.2 kΩ ±1%, 1/4 W Metal Film	013-076-9-017
R158 ##	4.3 kΩ ±1%, 1/4 W Metal Film	013-034-9-040
R158 ***	6.2 kΩ ±1%, 1/4 W Metal Film	013-078-9-001
R159	9.1 kΩ ±1%, 1/4 W Metal Film	013-076-9-018
R160	3 MΩ ±1%, 1/4 W Metal Film	013-076-9-019
R161	1 MΩ ±1%, 1/4 W Metal Film	015-144-1-004
R162	500 kΩ ±1%, 1/4 W Metal Film	013-012-9-002
R163	300 kΩ ±1%, 1/4 W Metal Film	013-013-9-017
R164	100 kΩ ±1%, 1/4 W Metal Film	015-144-1-003
R165	50 kΩ ±1%, 1/4 W Metal Film	013-076-9-020
R166	30 kΩ ±1%, 1/4 W Metal Film	013-076-9-021
R167	20 kΩ ±1%, 1/4 W Metal Film	015-144-2-002
R171	4.7 kΩ ±1%, 1/4 W Metal Film	013-061-9-001
R175	2.2 kΩ ±1%, 1/4 W Metal Film	013-013-9-009
R176	2.2 kΩ ±1%, 1/4 W Metal Film	013-013-9-009
R180 *	9.1 kΩ ±1%, 1/4 W Metal Film	013-076-9-018
R180 #	12 kΩ ±1%, 1/4 W Metal Film	013-053-9-003
R190	10 kΩ ±5%, 2 W Metal Film	011-002-5-103
R200 ***	1 MΩ ±1%, 1/4 W Metal Film	015-144-1-004
R207 *	12 kΩ ±1%, 1/4 W Metal Film	013-053-9-003
R207 #	9.1 kΩ ±1%, 1/4 W Metal Film	013-076-9-018
R214	3.6 kΩ ±1%, 1/4 W Metal Film	013-053-9-002
VR1	100 kΩ Trimpot	008-467-9-006
VR101	10 kΩ Potentiometer with Switch, TRIG LEVEL/SLOPE Control	008-467-9-007
VR102	10 kΩ Potentiometer with Switch, H POSITION/X10 MAG Control	008-467-9-007
VR103	Part of S103	
VR104	10 kΩ Trimpot	008-467-9-008
VR105	2 kΩ Trimpot	008-434-9-011
VR106	100 Ω Trimpot	008-434-9-002
VR107	1 kΩ Trimpot	008-434-9-012
VR108	Not Used	
VR109	200 kΩ Potentiometer, ASTIG Control	008-467-9-009
VR110	Not Used	
VR111	500 Ω Trimpot	008-434-9-003
	CAPACITORS	
C1	33 pF ±5%, 50 V, Ceramic	020-326-9-001
C2	1 pF ±0.25 pF, 500 V, Ceramic	020-326-9-002
C3	4700 pF ±10%, 500 V, Ceramic	020-302-9-003
C4	10 µF ±20%, 50 V, Electrolytic	022-264-9-005
C5	10 µF ±20%, 250 V, Electrolytic	021-073-9-004
C6	0.1 µF ±10%, 50 V, Mylar	025-209-9-001
C7	0.015 µF ±10%, 50 V, Mylar	025-209-9-002
C8	470 µF ±20%, 35 V, Electrolytic	022-264-9-006
C9	0.1 µF ±10%, 50 V, Mylar	025-209-9-001
C10	0.022 µF ±10%, 50 V, Mylar	025-209-9-003
C11	1000 pF ±10%, 500 V, Ceramic	020-296-9-005
C12 *	0.01 µF, 2 kV, Ceramic	020-307-9-001
C12 #	3300 pF, 3.1 kV, Ceramic	020-171-9-012
C13 *	0.01 µF, 2 kV, Ceramic	020-307-9-001
C13 #	3300 pF, 3.1 kV, Ceramic	020-171-9-012
C14	Not Used	
C15	1 µF ±20%, 250 V, Electrolytic	021-073-9-003
C16	4.7 µF ±20%, 250 V, Electrolytic	021-073-9-006
C17	4700 pF ±10%, 500 V, Ceramic	020-302-9-003
C18	47 µF ±20%, 25 V, Electrolytic	022-264-9-007
C19	10 pF ±0.5 pF, 50 V, Ceramic	020-326-9-003

CODE: * = Model 1522 only, ** = Model 1476A only, *** = Model 1466A only, # = Model 1466A and 1476A, ## = Model 1476A and 1522.

HORIZONTAL & HIGH VOLTAGE UNIT (X74-1340)
continued

SCHEMATIC SYMBOL	DESCRIPTION	DYNASCAN PART NO.
C20	100 µF ±20%, 25 V, Electrolytic	022-226-9-002
C21	0.01 µF ±10%, 500 V, Ceramic	020-296-9-007
C22, 23	100 µF ±20%, 25 V, Electrolytic	022-226-9-002
C24, 25	220 µF ±20%, 35 V, Electrolytic	033-071-9-002
C26	0.01 µF, 50 V, Ceramic	020-245-9-001
C27	4700 pF ±10%, 500 V, Ceramic	020-302-9-003
C28	3.3 µF ±20%, 100 V, Electrolytic	021-073-9-007
C29 *	0.01 µF, 2 kV, Ceramic	033-071-9-003
C29 #	4700 pF, 3 kV, Ceramic	033-072-9-001
C30 *	1000 pF, 2 kV, Ceramic	020-226-9-002
C30 #	1000 pF, 3.1 kV, Ceramic	020-226-9-003
C31	18 pF ±5%, 50 V, Ceramic	020-326-9-004
C101	0.01 µF ±10%, 50 V, Mylar	025-209-9-004
C102	0.01 µF ±10%, 50 V, Mylar	025-209-9-004
C103	0.01 µF, 50 V, Ceramic	020-245-9-001
C104	0.01 µF, 50 V, Ceramic	020-245-9-001
C105	100 pF ±5%, 50 V, Ceramic	020-142-9-007
C106	10 µF ±20%, 50 V, Electrolytic	022-264-9-005
C107	Not Used	
C108	1 µF ±20%, 50 V, Electrolytic	022-264-9-008
C109	4700 pF ±10%, 50 V, Ceramic	020-302-9-001
C110	0.01 µF, 50 V, Ceramic	020-245-9-001
C111	100 pF ±5%, 50 V, Ceramic	020-142-9-007
C112	0.01 µF, 50 V, Ceramic	020-245-9-001
C113	100 pF ±5%, 50 V, Ceramic	020-142-9-007
C114	1 µF ±20%, 50 V, Electrolytic	022-264-9-008
C115	100 µF ±20%, 10 V, Electrolytic	022-264-9-009
C116	0.01 µF, 50 V, Ceramic	020-245-9-001
C117	0.01 µF, 50 V, Ceramic	020-245-9-001
C118	10 pF ±0.5 pF, 500 V, Ceramic	020-163-9-003
C119 *	5 pF ±0.25 pF, 500 V, Ceramic	020-326-9-005
C119 #	10 pF ±0.5 pF, 500 V, Ceramic	020-163-9-003
C120	1 µF ±5%, 100 V, Polyester	025-209-9-005
C121	0.01 µF ±1%, 100 V, Mylar	025-184-9-002
C122	90 pF ±5%, 100 V, Mica	023-083-9-001
C123	1000 pF ±10%, 50 V, Ceramic	020-326-9-006
C124-126	0.01 µF, 50 V, Ceramic	020-245-9-001
C127	33 pF ±5%, 50 V, Ceramic	020-326-9-001
C128	47 µF ±20%, 25 V, Electrolytic	022-264-9-007
C129	1 µF ±20%, 50 V, Electrolytic	022-264-9-010
C130	Not Used	
C131	0.01 µF, 50 V, Ceramic	020-245-9-001
C132	Not Used	
C133	0.01 µF, 50 V, Ceramic	020-245-9-001
C134 *	27 pF ±5%, 50 V, Ceramic	020-326-9-007
C134 #	47 pF ±5%, 50 V, Ceramic	020-328-9-003
C135	3 pF ±0.25 pF, 500 V, Ceramic	020-326-9-008
C136	150 pF ±5%, 100 V, Mica	023-061-9-001
C137 *	68 pF ±5%, 50 V, Ceramic	020-142-9-006
C138 *	1 pF ±0.25 pF, 500 V, Ceramic	020-326-9-002
C139 *	1 pF ±0.25 pF, 500 V, Ceramic	020-326-9-002
C140	0.01 µF, 50 V, Ceramic	020-245-9-001
C141 ##	1000 pF ±10%, 50 V, Ceramic	020-326-9-006
C142 ##	220 pF ±5%, 50 V, Ceramic	020-163-9-006
C143	0.01 µF, 50 V, Ceramic	020-245-9-001
C144	0.01 µF, 50 V, Ceramic	020-245-9-001
C145	0.1 µF, 12 V, Ceramic	033-071-9-004
C146-149	0.01 µF, 50 V, Ceramic	020-245-9-001
C150	100 µF ±20%, 25 V, Electrolytic	022-226-9-002
C151	220 µF ±20%, 10 V, Electrolytic	022-225-9-001
C152	100 µF ±20%, 25 V, Electrolytic	022-226-9-002
C153	0.01 µF, 50 V, Ceramic	020-245-9-001
C154	4.7 µF ±20%, 250 V, Electrolytic	021-073-9-006
C155	4700 pF ±10%, 500 V, Ceramic	020-302-9-003
C156	Not Used	
C157 ***	0.01 µF ±10%, 50 V Mylar	025-209-9-004
C158	15 pF ±5%, 50 V, Ceramic	020-326-9-009
C159-161	47 µF ±20%, 25 V, Electrolytic	022-264-9-007
C162 *	Not Used	
C162 #	0.01 µF, 50 V, Ceramic	020-245-9-001
C163	10 pF ±0.5 pF, 50 V, Ceramic	020-326-9-003
C164	0.01 µF, 50 V, Ceramic	020-245-9-001
C165	47 pF ±5%, 50 V, Ceramic	020-149-9-006
C166 ***	10 pF ±0.5 pF, 50 V Ceramic	020-326-9-003
C167 *	100 pF ±5%, 50 V, Ceramic	020-142-9-007
C167 #	220 pF ±5%, 50 V, Ceramic	020-163-9-006
TC101	20 pF Trimmer	028-073-9-005

DIODES

D1, 2	DS442X Silicon Switching Diode	151-097-9-001
D3 *	High Voltage Rectifier Block	157-023-9-001
D3 #	High Voltage Rectifier Block	157-024-9-001
D4, 5	W06C Silicon HV Rectifier Diode	151-052-9-002
D6, 7	1SS83 Silicon HV Switching Diode	151-084-9-001
D8, 9	DS442X Silicon Switching Diode	151-097-9-001
D101	DS442X Silicon Switching Diode	151-097-9-001
D102	Not Used	
D103-111	DS442X Silicon Switching Diode	151-097-9-001
D112 *	DS442X Silicon Switching Diode	151-097-9-001
D112 **	DS442X Silicon Switching Diode	151-097-9-001
D113 *	DS442X Silicon Switching Diode	151-097-9-001
D113 **	DS442X Silicon Switching Diode	151-097-9-001
D114	Not Used	
D115 *	DS442X Silicon Switching Diode	151-097-9-001
D115 **	DS442X Silicon Switching Diode	151-097-9-001
D116 #	1SS83 Silicon High Voltage Switching Diode	151-084-9-001
D117	WZ-050 Zener Diode, 5.0 Volt	152-069-9-001
D118 ***	DS442X Silicon Switching Diode	151-097-9-001
D119	Not Used.	
D120 ***	DS442X Silicon Switching Diode	151-097-9-001
D121	DS442X Silicon Switching Diode	151-097-9-001
D122 #	1SS83 Silicon High Voltage Switching Diode	151-084-9-001
D123 #	1SS83 Silicon High Voltage Switching Diode	151-084-9-001

TRANSISTORS

Q1	2SC2912(S) NPN Power Transistor	172-066-9-002
Q2	2SA1210(S) PNP Power Transistor	173-014-9-002
Q3	2SD613(E) NPN Power Transistor	176-104-9-002
Q4	2SC2785(F) NPN Transistor	176-147-9-002
Q5	2SC2271(D) NPN Transistor	176-147-9-004
Q101-102	2SK117(Y) N-Channel FET	182-072-9-002
Q103-106	2SC2785(F) NPN Transistor	176-147-9-002
Q107-108	2SA1175(F) PNP Transistor	177-063-9-001
Q109 *	2SA838(C) PNP Transistor	177-036-9-001
Q110 *	2SA838(C) PNP Transistor	177-036-9-001
Q109 #	2SA1175(F) PNP Transistor	177-063-9-001
Q110 #	2SA1175(F) PNP Transistor	177-063-9-001
Q111-112	2SA1175(F) PNP Transistor	177-063-9-001
Q113-114	2SC2785(F) NPN Transistor	176-147-9-002
Q115	2SK117(Y) N-Channel FET	182-072-9-002
Q116-120	2SC2785(F) NPN Transistor	176-147-9-002
Q121-123	2SA1175(F) PNP Transistor	177-063-9-001

CODE: * = Model 1522 only, ** = Model 1476A only, *** = Model 1466A only,
= Model 1466A and 1476A, ## = Model 1476A and 1522.

SCHEMATIC SYMBOL	DESCRIPTION	DYNASCAN PART NO.
	HORIZONTAL & HIGH VOLTAGE UNIT (X74-1340) continued	
Q124	2SC2912(S) NPN Power Transistor	172-066-9-002
Q125	2SA1210(S) PNP Power Transistor	173-014-9-002
Q126	2SC2785(F) NPN Transistor	176-147-9-002
Q127	2SC2912(S) NPN Transistor	172-066-9-002
Q128-129	2SC2785(F) NPN Transistor	176-147-9-002
Q130 ***	2SK117(Y) N-Channel FET	182-072-9-002
Q131 ***	2SA1175(F) PNP Transistor	177-063-9-001
	INTEGRATED CIRCUITS	
U1	NJM4558D Dual Op-Amp	307-139-9-004
U101	MC10103L Digital IC	307-309-9-003
U102	SN74LS112N Digital IC	307-139-9-001
U103	SN74LS02N Digital IC	307-157-9-001
U104 ##	SN74LS00N Digital IC	307-139-9-002
U105 ##	SN74LS08N Digital IC	307-259-9-010
	INDUCTORS	
L1, 2	100 µH Ferri-Inductor	041-141-9-003
L3	1 mH Ferri-Inductor	041-141-9-004
L4-7	1 mH Ferri-Inductor	041-141-9-005
L8	4.7 µH Ferri-Inductor	041-068-9-008
L101	100 µH Ferri-Inductor	041-141-9-003
	TRANSFORMERS	
T1 *	DC-to-DC Converter Transformer	064-027-9-001
T1 #	DC-to-DC Converter Transformer	064-0028-9-001
	SWITCHES	
S101	Part of VR101	
S102	Part of VR102	
S103 *	Rotary Switch, 20-Position, with 2 kΩ Potentiometer, SWEEP TIME/DIV and VARIABLE Control	083-293-9-002
S103 #	Rotary Switch, 19-Position, with 2 kΩ Potentiometer, SWEEP TIME/DIV and VARIABLE Control	083-294-9-002
S104 ##	Lever Switch, 5-Position, SOURCE	080-014-9-001
S104 ***	Lever Switch, 3-Position, SOURCE	080-003-9-004
S105	Lever Switch, 3-Position, COUPLING	080-003-9-004
S106	Slide Switch, 3-Position, TRIG MODE	080-003-9-001
	MISCELLANEOUS	
NL1, 2	NE-2B Neon Lamp	401-024-9-001
	Holder, Neon Lamp	253-117-9-001
	CRT SOCKET UNIT (X81-1250)	
C1	1 pF ±0.25 pF, 500 V, Ceramic	020-326-9-002
C2	3 pF ±0.25 pF, 50 V, Ceramic	020-112-9-001
L1, 2	2.2 µH Fixed Inductor	041-141-9-006

SCHEMATIC SYMBOL	DESCRIPTION	DYNASCAN PART NO.
	CONNECTION UNIT (X77-1260)	
	RESISTORS	
	Unlisted resistors are ±5%, 1/4 W. See schematic diagram for value.	
R6	130 Ω ±1%, 1/4 W Metal Film	015-144-1-300
R7	43 kΩ ±1%, 1/4 W Metal Film	013-076-9-006
R8	91 kΩ ±1%, 1/4 W Metal Film	013-076-9-007
R9	100 kΩ ±1%, 1/4 W Metal Film	015-144-1-003
R10	3.6 kΩ ±1%, 1/4 W Metal Film	013-053-9-002
R13 *	10 Ω ±5%, 1/2 W Carbon	002-102-5-100
	CAPACITORS	
C1	0.01 µF ±5%, 50 V, Mylar	025-144-9-001
C2	0.01 µF ±10%, 50 V, Ceramic	020-296-9-001
	DIODES	
D1, 2	DS442X Silicon Switching Diode	151-097-9-001
D3 *	S1QB40 Bridge Rectifier	157-013-9-001
D4	WZ-120 Zener Diode, 12.0 V	152-110-9-001
	TRANSISTORS	
Q1	2SC1384 NPN Silicon Transistor	176-109-9-001
Q2	2SA684 PNP Silicon Transistor	177-046-9-001
	INTEGRATED CIRCUITS	
U1	NJM4558D Dual Op-Amp	307-139-9-004
	MAIN CHASSIS	
	ELECTRICAL PARTS	
Q1 *	2SD613E NPN Power Transistor	172-104-9-002
S1 #	Rotary Switch, POWER	083-294-9-001
VR1 *	10 kΩ Potentiomete with Switch, POWER/SCALE ILLUM Control	008-406-9-006
VR2	3 MΩ Potentiometer, FOCUS Control	008-390-9-001
VR3	10 kΩ Potentiometer, INTENSITY Control	008-467-9-001
VR4	20 kΩ Potentiometer, TRACE ROTATION Control	008-467-9-002
*	CRT, 150FTM31	230-023-9-001
#	CRT, 150GTM31	230-024-9-001
	Trace Rotation Coil	041-141-9-001
	Power Transformer	065-184-9-001
	BNC Receptacle	773-090-9-001
	PROBE ADJ Terminal	345-072-9-001
	GND Terminal	345-065-9-001
	LED, POWER Pilot Light	400-072-9-001

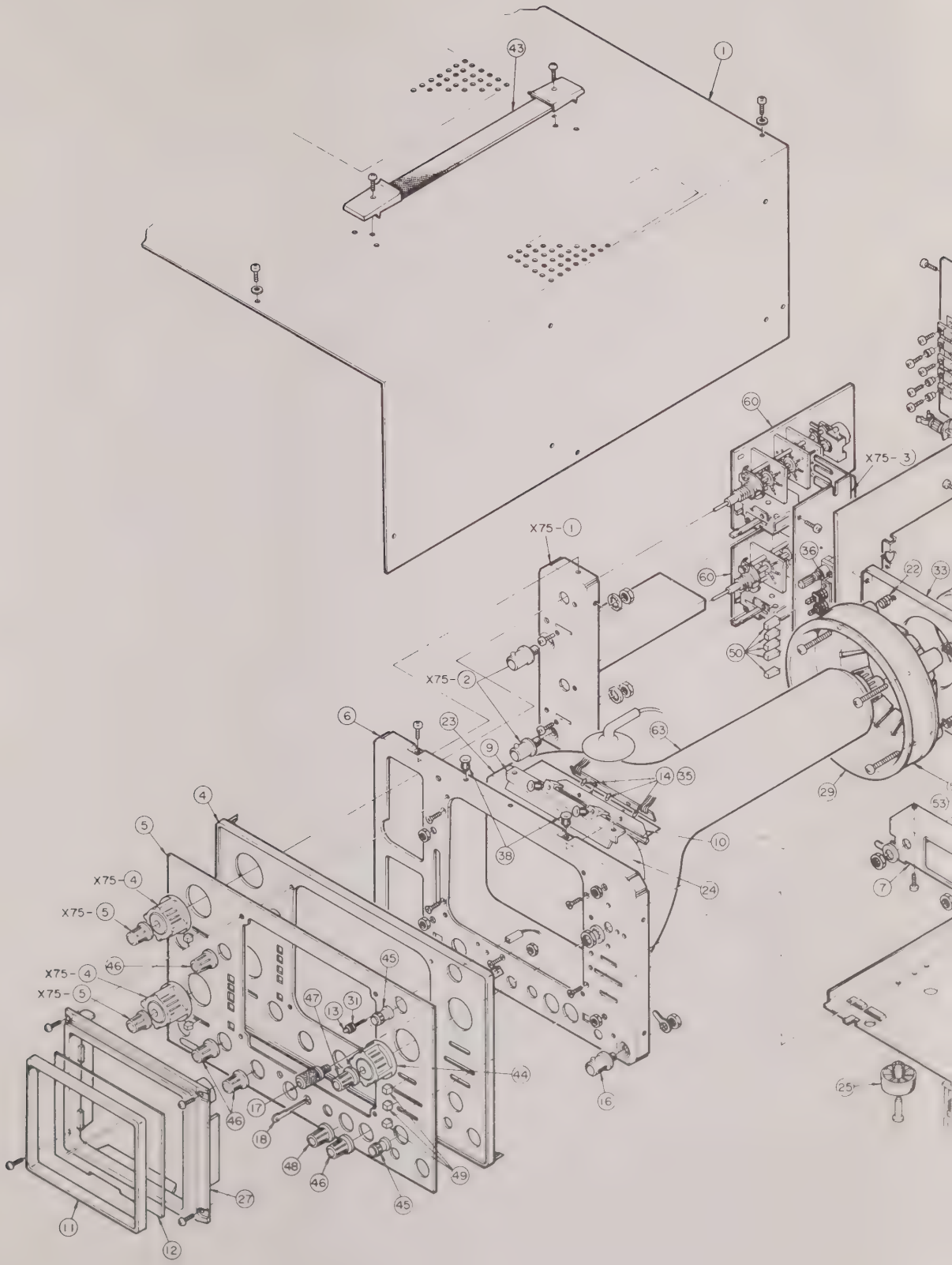
CODE: * = Model 1522 only, ** = Model 1476A only, *** = Model 1466A only, # = Model 1466A and 1476A, ## = Model 1476A and 1522.

MECHANICAL PARTS LIST

(Refer to Exploded View)

Unless otherwise noted, parts apply to Model 1466A, 1476A and 1522.

ITEM	DESCRIPTION	DYNASCAN PART NO.
MAIN CHASSIS		
1	Case, Top	272-167-9-001
2	Case, Bottom	272-166-9-001
3	Chassis	257-147-9-001
4	Panel, Molded	380-474-9-001
5	Front Panel Inlay	
	Model 1466A	260-353-9-001
	Model 1476A	260-352-9-001
	Model 1522	260-351-9-001
6	Sub Panel, Front	254-070-9-001
7	Sub Panel, Focus/Intensity	254-071-9-001
8	Rear Panel	
	Model 1466A, 1476A	262-052-9-001
	Model 1522	262-050-9-001
9	Reflector (for Lamp Assembly)	
	Model 1522 only	261-174-9-001
10	Reflector (for Lamp Assembly)	
	Model 1522 only	261-175-9-001
11	Frame, for CRT Filter	769-133-9-001
12	Filter, Blue (for CRT)	380-474-9-002
13	LED, red (POWER Pilot Light)	400-072-9-002
14	Lamp (Model 1522 only)	400-089-9-002
	Lamp Assembly (1522 only)	400-089-9-001
15	Spacer, Tilt Stand	342-109-9-001
16	BNC Receptacle	773-090-9-001
17	Terminal, GND	345-065-9-001
18	Terminal, PROBE ADJ	345-072-9-001
19	AC Power Cord	420-013-9-001
20	Fuse, 0.5 A (for 220V)	191-251-3-001
	Fuse, 0.8 A (for 120V)	191-013-9-003
21	Shield, CRT	256-179-9-001
22	Spring, CRT Mounting	767-130-9-001
23	Reflector Sheet (L), 1522 only	261-156-9-001
24	Reflector Sheet (R), 1522 only	261-158-9-001
25	Rubber Foot	381-090-9-002
26	Tilt Stand	381-121-9-001
27	Bezel	380-474-9-003
28	Fuse Holder	742-029-9-001
29	Support, CRT	741-164-9-001
30	Support, Cable	741-164-9-004
31	Mount, LED	741-164-9-002
32	Mounting Bracket, Tilt Stand	251-571-9-001
33	Mounting Bracket, CRT	251-572-9-001
34	Plate for Power Cord	251-573-9-001
35	PC Board, Lamp Assy (1522 only)	302-710-9-001
36	Collar	769-133-9-003
37	Bushing	381-121-9-002
38	Nylon Rivet, Lamp Assy (1522 only)	381-121-9-003
40	Support (I type)	380-474-9-005
41	Support (T type)	380-474-9-006
42	Standoff Clip	763-191-9-001
43	Handle	746-068-9-001
44	Knob, SWEEP TIME/DIV	751-270-9-001
45	Knob, H POS, TRIG LEVEL	751-270-9-002
46	Knob, V POS, POWER, INTENSITY	751-270-9-003
47	Knob, SWEEP VARIABLE	751-270-9-004
48	Knob, FOCUS	751-270-9-003
49	Knob, Lever Switch	751-235-9-001
50	Knob, Pushbutton (1476A, 1522 only)	751-270-9-005
51	Power Transformer	065-184-9-001
52	Trace Rotation Coil	041-141-9-001
53	Rotary Switch, POWER	
	Model 1466A, 1476A	083-294-9-001
	Rotary Switch with 10 kΩ Variable Resistor, POWER/SCALE ILLUM Control	
	Model 1522	008-406-9-006
54	Variable Resistor, 10 kΩ	
	INTENSITY Control	008-467-9-001
55	Variable Resistor, 20 kΩ	
	TRACE ROTATION Control	008-467-9-002
56	Variable Resistor, 3 MΩ	
	FOCUS Control	008-390-9-001
57	Cord Wrap/Leg	380-338-9-006
58	Vertical & Power Supply Unit	
	Model 1466A, X73-1491-62	523-535-9-002
	Model 1476A, X73-1491-61	523-532-9-001
	Model 1522, X73-1490-00	523-531-9-001
59	Horizontal & High Voltage Unit	
	Model 1466A, X74-1340-03	523-535-9-003
	Model 1476A, X74-1340-02	523-532-9-004
	Model 1522, X74-1340-00	523-531-9-002
60	Vertical Attenuator Unit	
	Model 1466A, X75-1140-03	523-535-9-004
	Model 1476A, X75-1140-02	523-532-9-003
	Model 1522, X75-1140-00	523-531-9-003
61	Connection Unit	
	Model 1466A, X77-1261-62	523-535-9-005
	Model 1476A, X77-1260-61	523-532-9-004
	Model 1522, X77-1260-00	523-531-9-004
62	CRT Socket Unit	
	Model 1466A, X81-1250-01	523-532-9-005
	Model 1476A, X81-1250-01	523-532-9-005
	Model 1522, X81-1250-00	523-531-9-005
63	CRT (Cathode Ray Tube)	
	Model 1466A, 150GTM31	230-024-9-001
	Model 1476A, 150GTM31	230-024-9-001
	Model 1522, 150FTM31	230-023-9-001
VERTICAL ATTENUATOR UNIT		
(items labeled X75- in exploded view)		
1	Sub Panel	254-072-9-001
2	BNC Receptacle	773-090-9-001
3	Shield Plate	256-179-9-002
	Shield Plate	256-179-9-003
4	Knob, VOLTS/DIV	751-270-9-001
5	Knob, VARIABLE	751-270-9-001
HORIZONTAL UNIT		
(items labeled X74- in exploded view)		
1	Heat Sink	747-035-9-001
2	Heat Sink	747-035-9-002
3	Heat Sink	747-124-9-001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4
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10
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X75-4
X75-5
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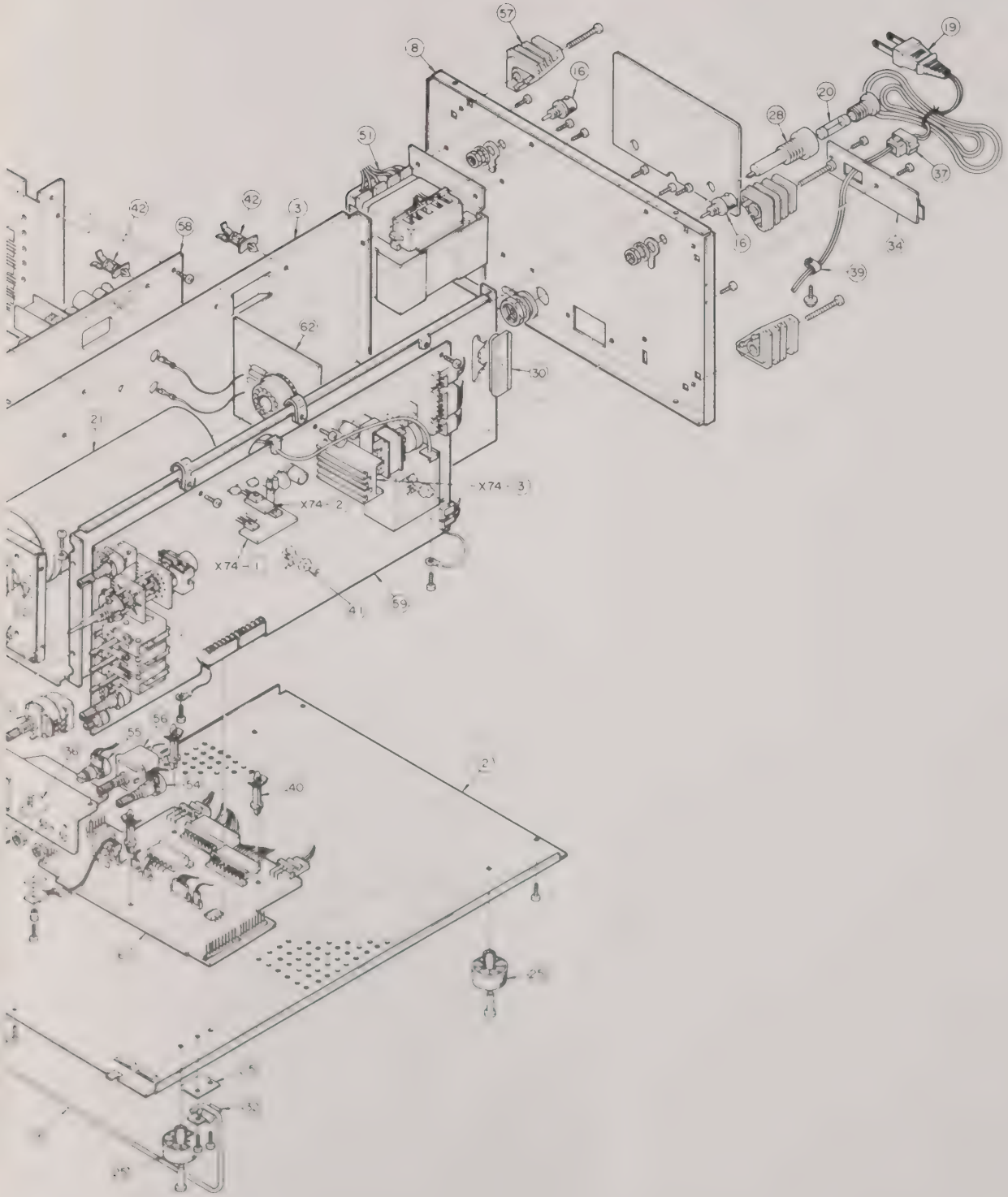
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X74 - 3
X74 - 2
X74 - 1
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21
25

SCHEMATIC DIAGRAMS AND CIRCUIT BOARD MAPS

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SEMICONDUCTORS 28

VERTICAL ATTENUATOR UNIT 29

VERTICAL AMPLIFIER & POWER UNIT 30

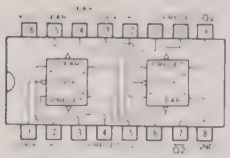
HORIZONTAL & HIGH VOLTAGE UNIT 34

CRT SOCKET UNIT 34

CONNECTION UNIT 38

MAIN CHASSIS 38

SEMICONDUCTORS



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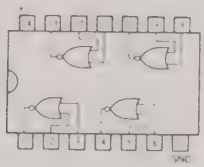

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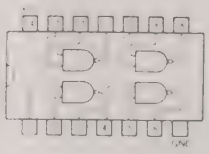

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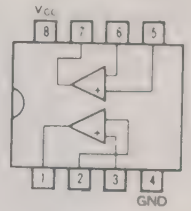

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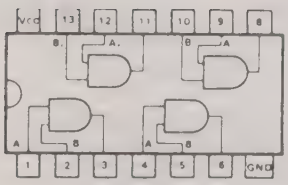

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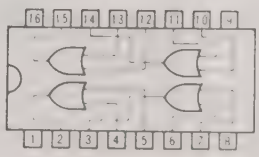

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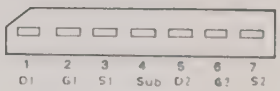
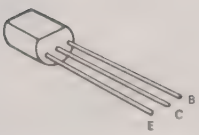


M47F(B)
M47F(C)

Bottom View



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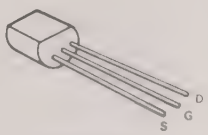
2SA838 (C) 2SC2271 (E)
2SA1005 (K)



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2SA1175 (F)
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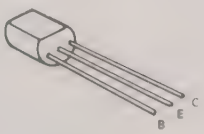

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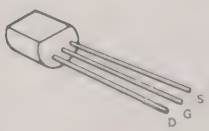

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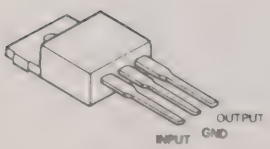

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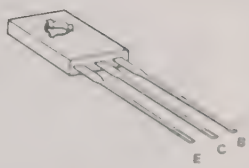

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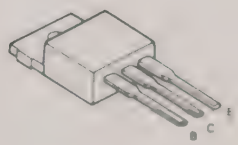

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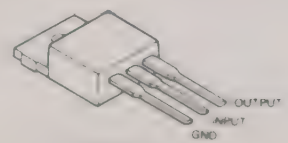

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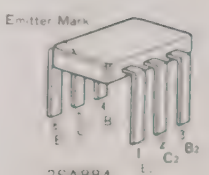

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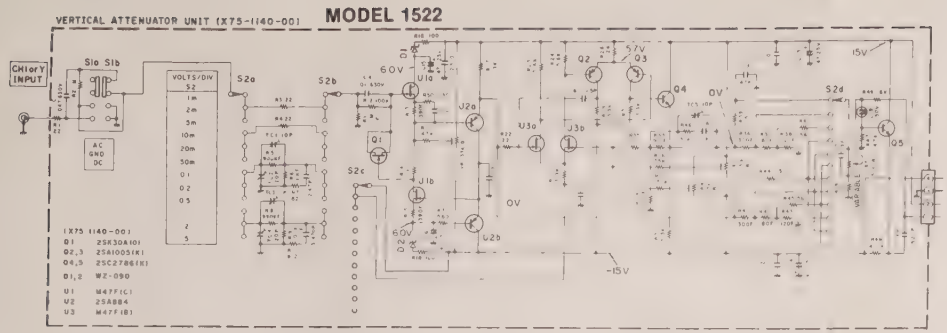
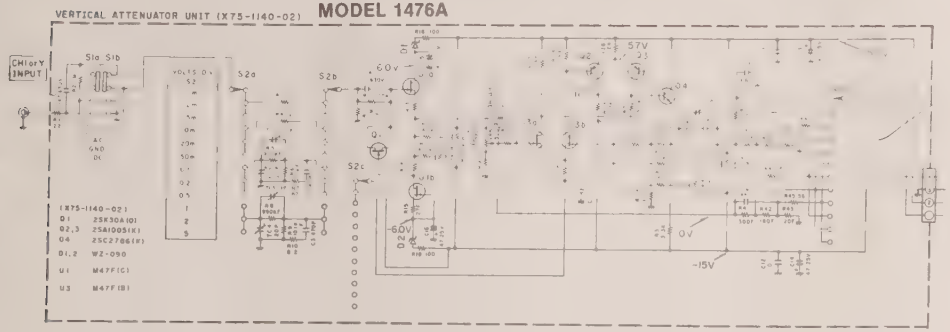
MODEL 1522



MODEL 1476A



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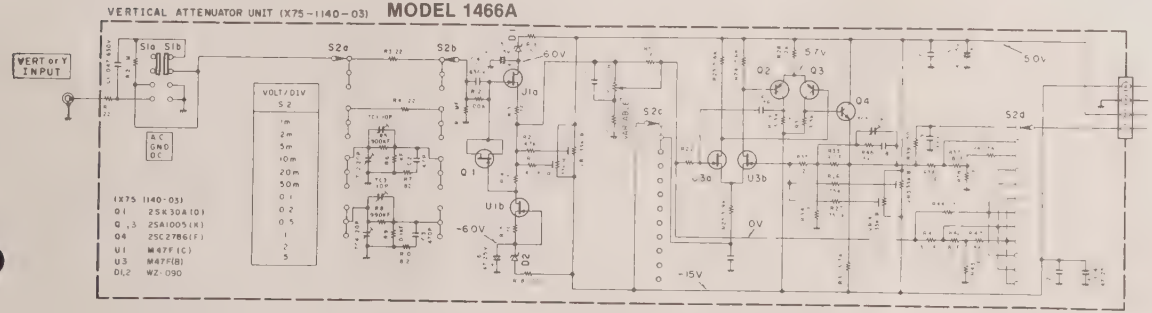
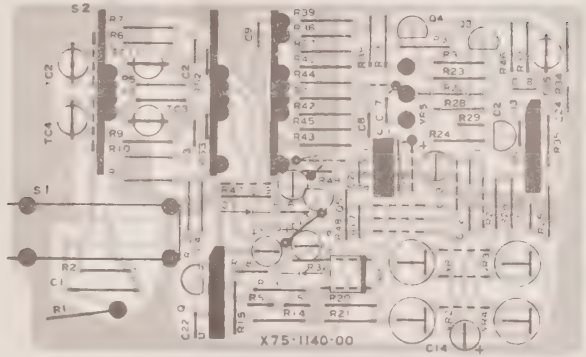
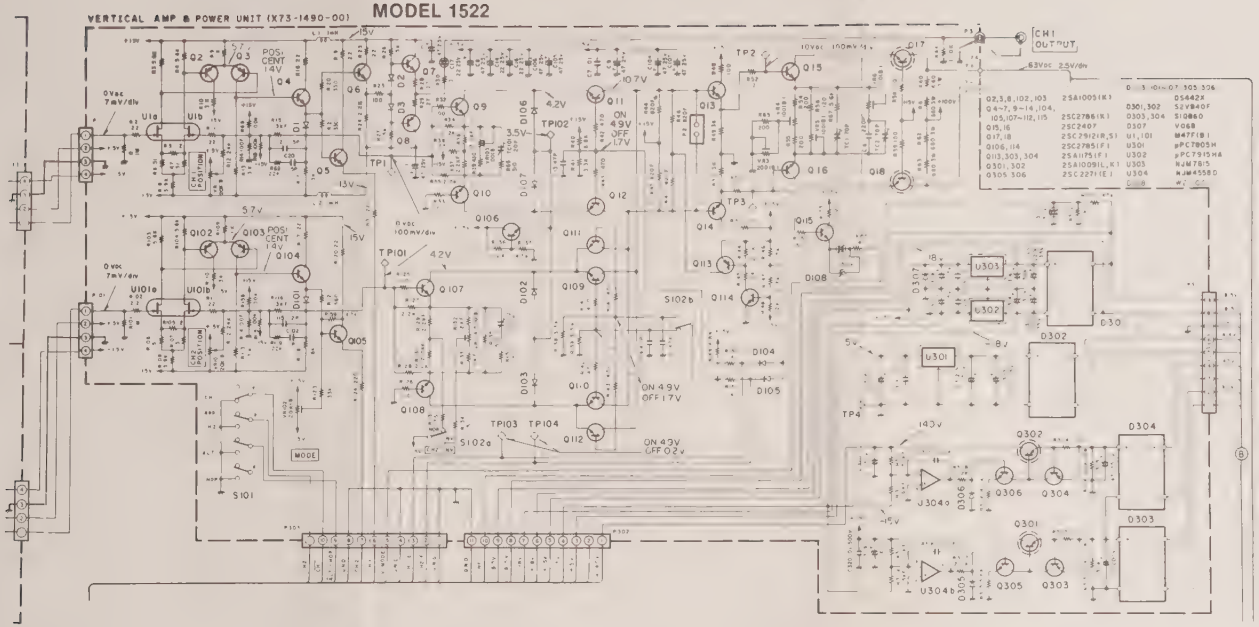


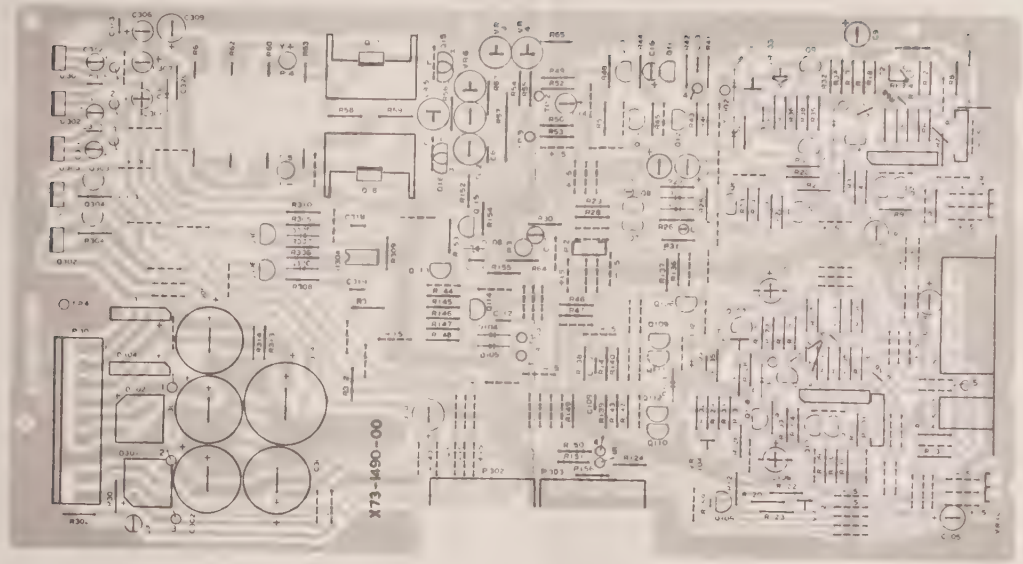
VERTICAL ATTENUATOR UNIT (X75-1140-00)

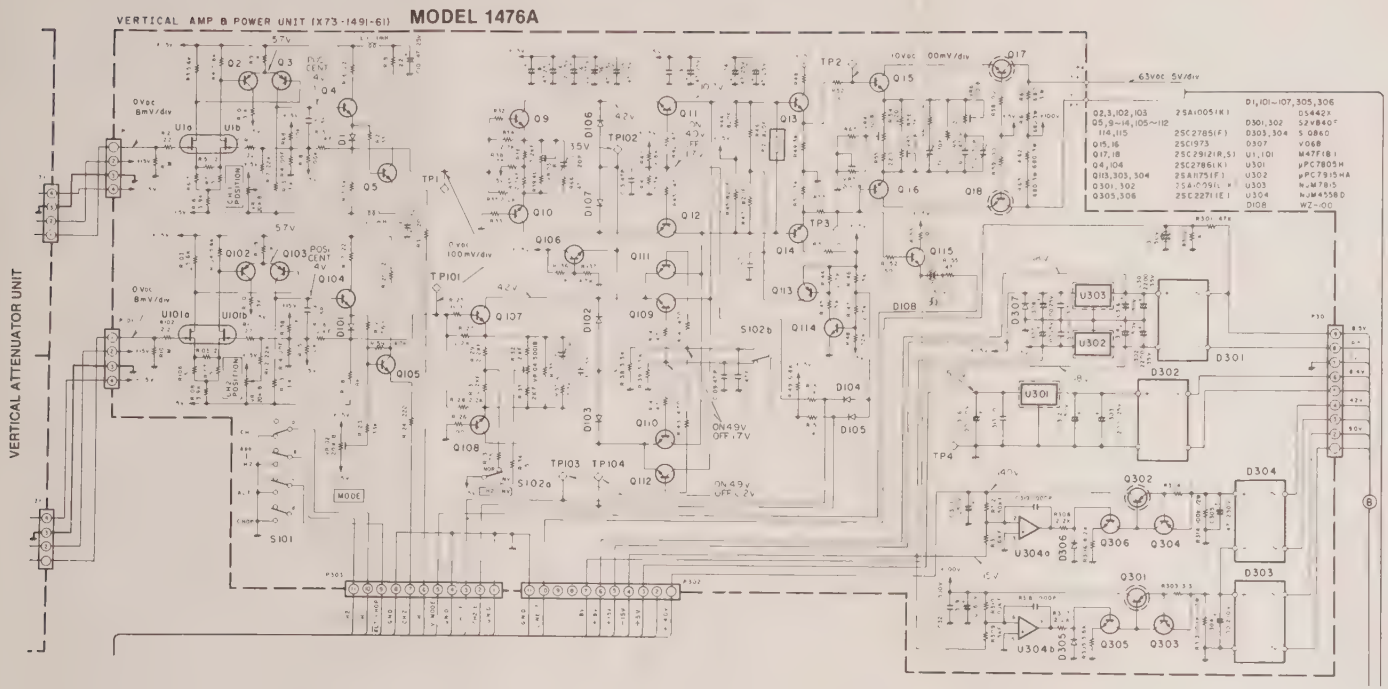


VERTICAL ATTENUATOR UNIT

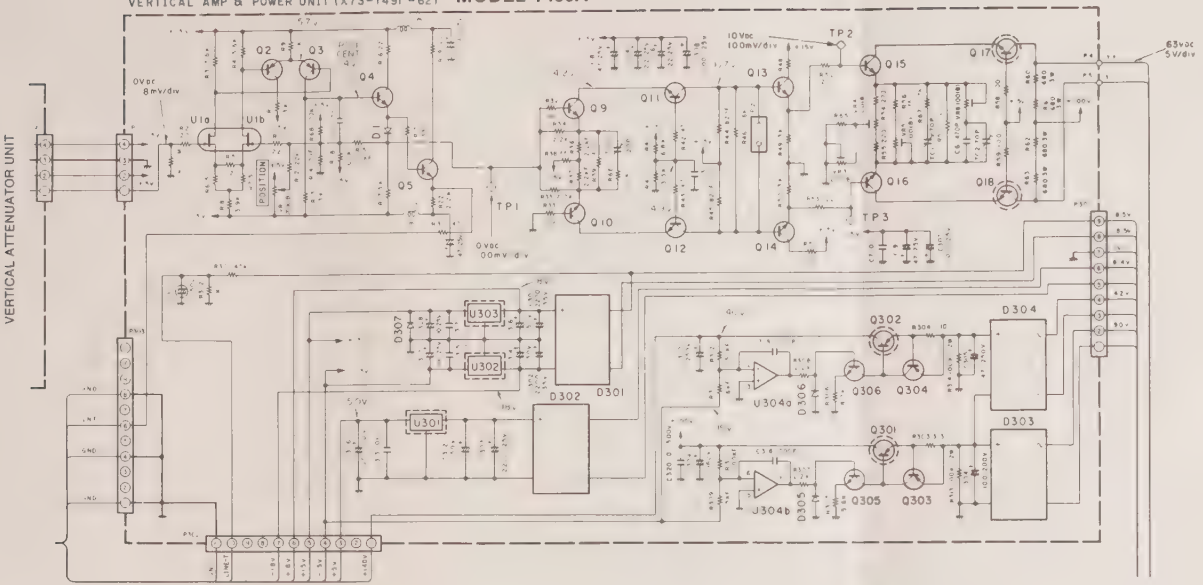


VERTICAL AMP & POWER UNIT (X73-1490-00)



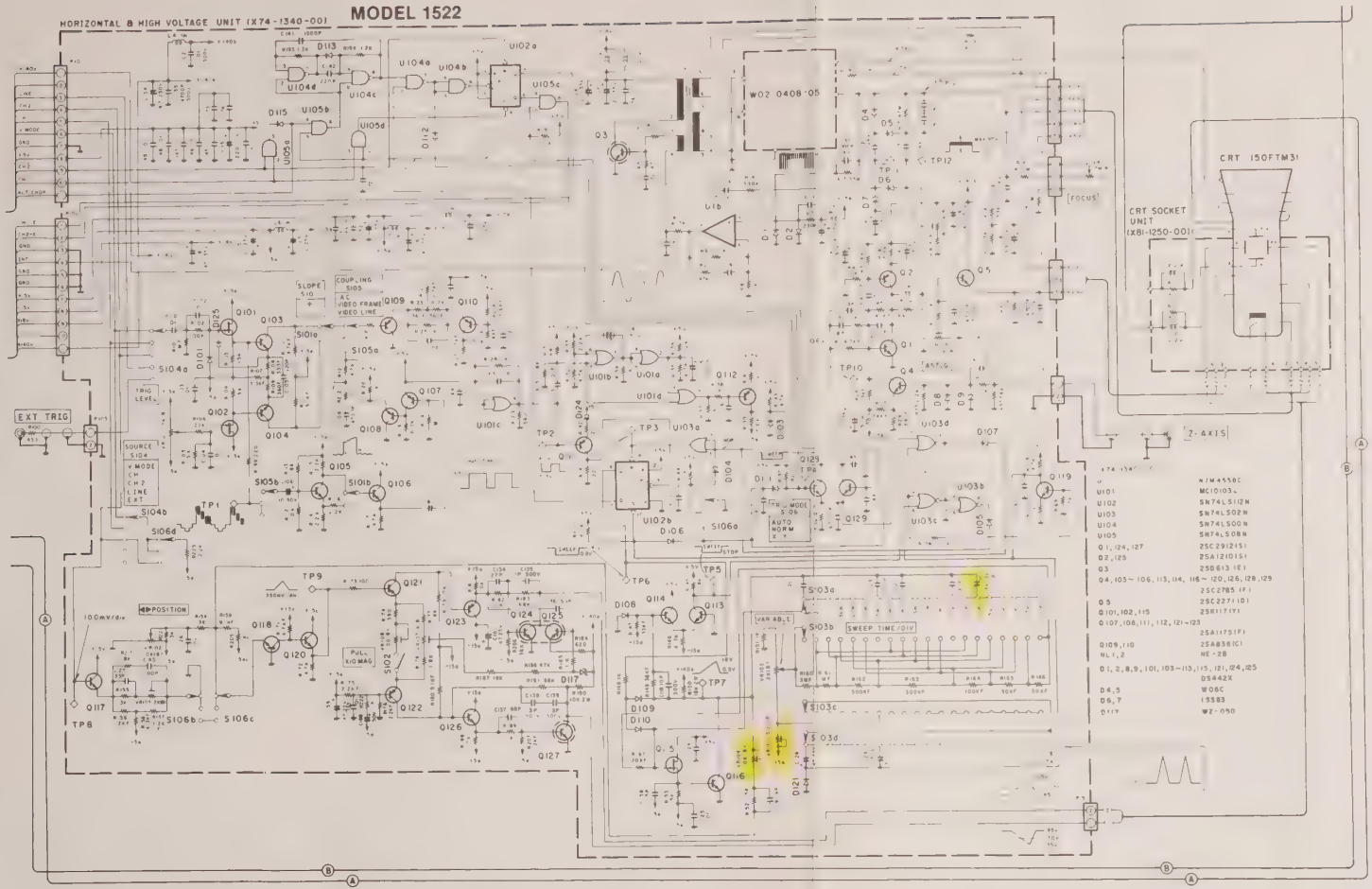

VERTICAL AMP & POWER UNIT (X73-1491-61)
MODEL 1476A
VERTICAL ATTENUATOR UNIT

VERTICAL AMP & POWER UNIT (X73-1491-62) **MODEL 1466A**

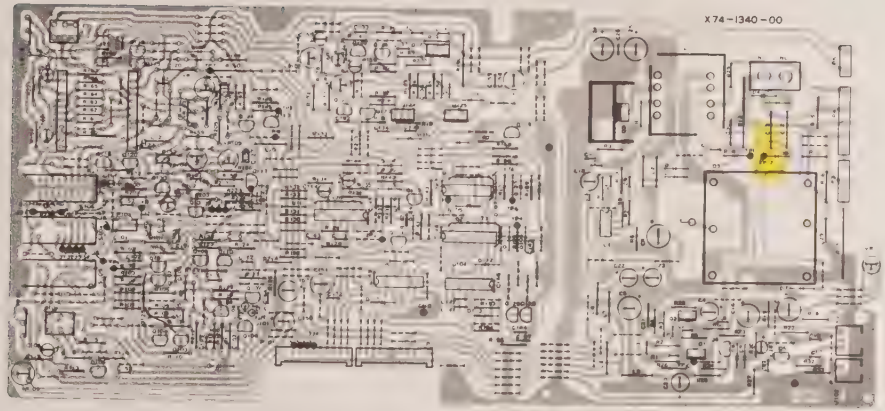


(X73-1491-62)

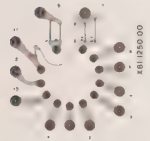
Q2,3	2SA1005(K)	Q303,304	2SA1175(F)	U1	M47F(B)
Q5,9~14	2SC2785(F)	Q305,306	2SC2271(E)	U301	μPC7805H
Q15,16	2SC1973			U302	μPC7915HA
Q17,18	2SC2912(R,S)	D305,306	DS442X	U303	NJM7815
Q301,302	2SA1009(L,K)	D301,302	S2VB40F	U304	NJM4558D
Q4	2SC2786(K)	D303,304	S10B60		
		D307	V06B		

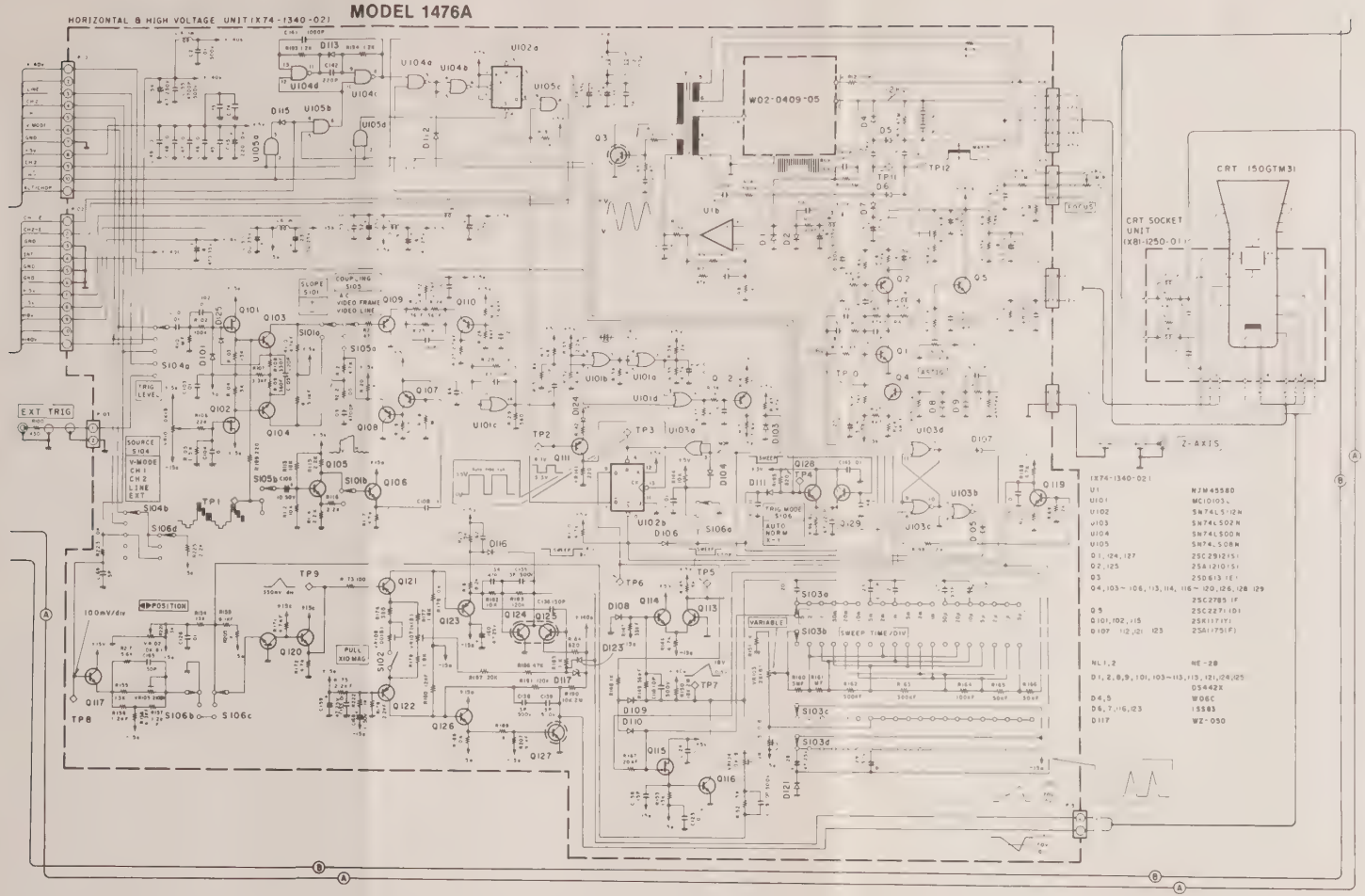

MODEL 1522
HORIZONTAL & HIGH VOLTAGE UNIT (X74-1340-001)
CRT 150FTM31
CRT SOCKET UNIT (X81-1250-00)
Z-AXIS
EXT TRIG
SWEEP TIME/DIV
POSITION
FOCUS
U101 MC10103
U102 SN74LS112N
U103 SN74LS02N
U104 SN74LS00N
U105 SN74LS08N
Q1,124,127 2SC2912(S)
Q2,125 2SA1210(S)
Q3 2SD613(E)
Q5 2SC2271(O)
Q109,110 2SA1175(F)
NL1,2 NE-2B
D4,5 W06C
D6,7 1S383
D117 WZ-090

HORIZONTAL & HIGH VOLTAGE UNIT (X74-1340-00)



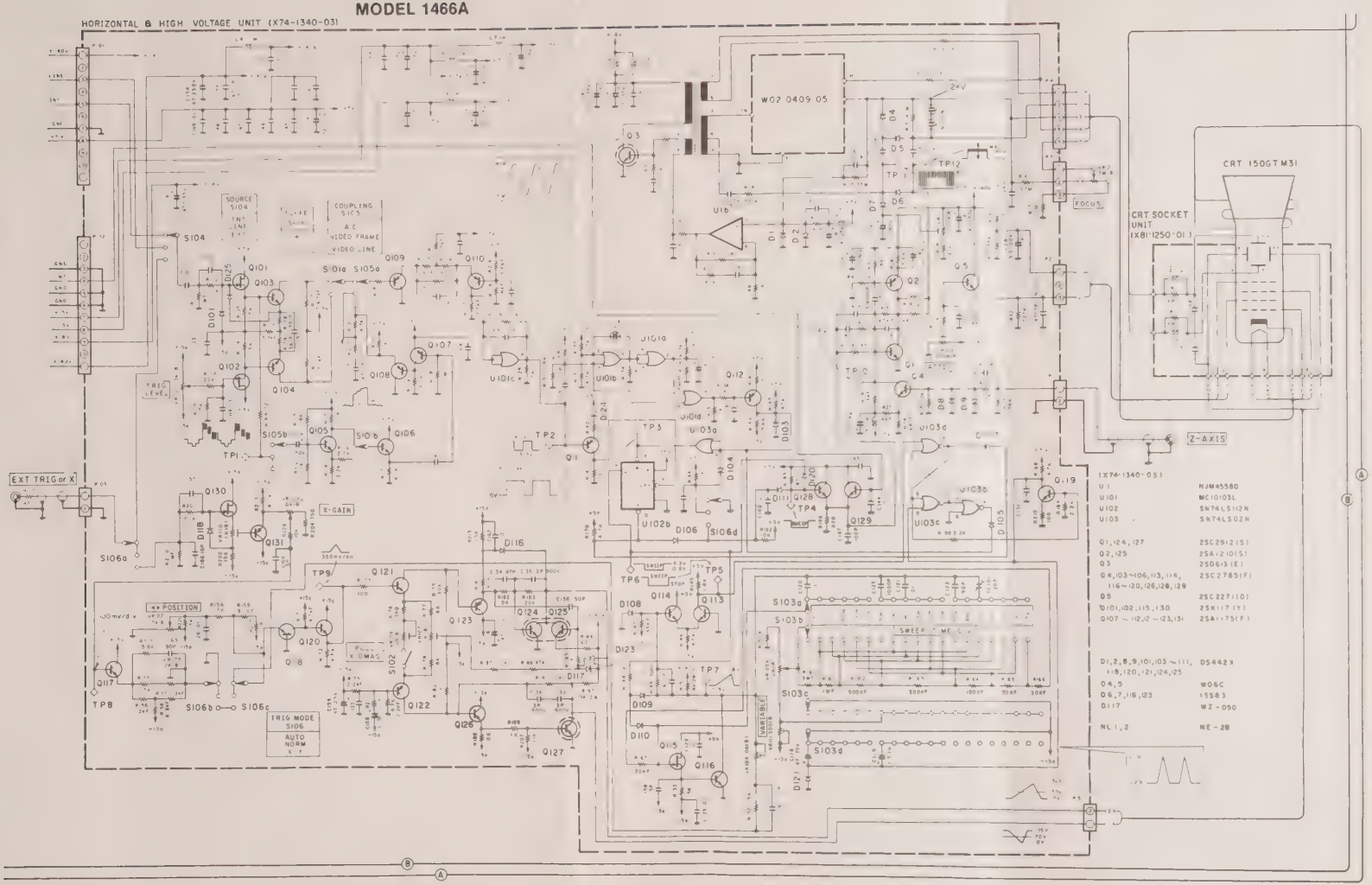
CRT SOCKET UNIT
(X81-1250-00)

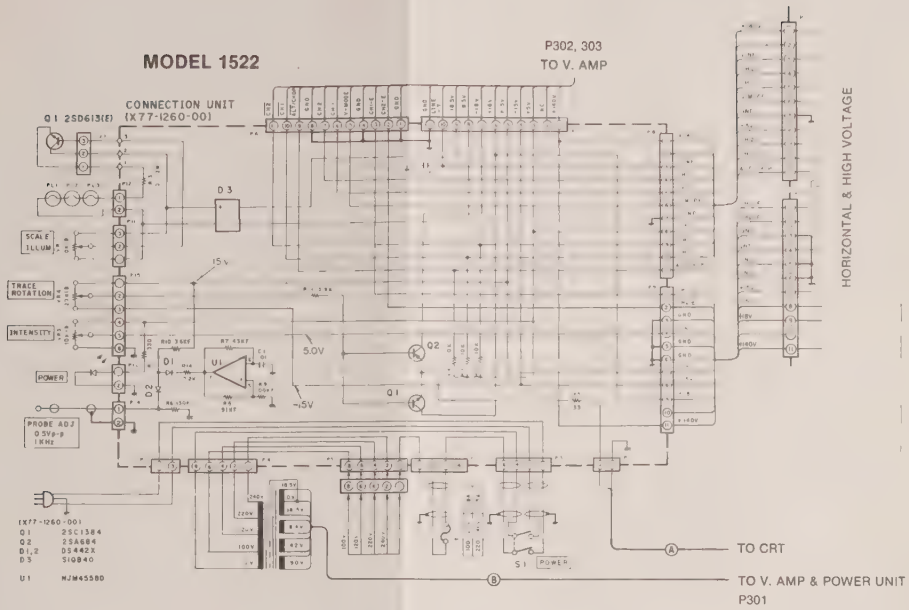



MODEL 1476A
HORIZONTAL & HIGH VOLTAGE UNIT (X74-1340-02)
W02-0409-05
CRT 150GTM31
CRT SOCKET UNIT (X81-1250-01)
Z-AXIS
EXT TRIG
100mV/div
POSITION
SWEEP TIME/DIV
VARIABLE
(X74-1340-02)
U1 NJM4558D
U101 MC10103
U102 SN74LS112N
U103 SN74LS02N
U104 SN74LS00N
U105 SN74LS08N
Q1,124,127 2SC2912(S)
Q2,125 2SA1210(S)
Q3 2SD613(E)
Q4,103~106,113,114,116~120,126,128,129 2SC2785(F)
Q5 2SC2271(O)
Q101,102,115 2SK117(Y)
Q107 112,121 123 2SA1175(F)
NL1,2 NE-2B
D1,2,8,9,101,103~113,119,121,124,125 DS442X
D4,5 W06C
D6,7,116,123 1SS83
D117 WZ-050

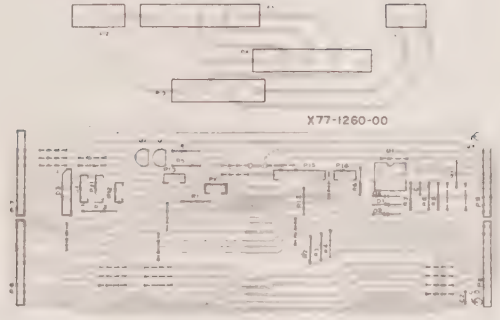
MODEL 1466A

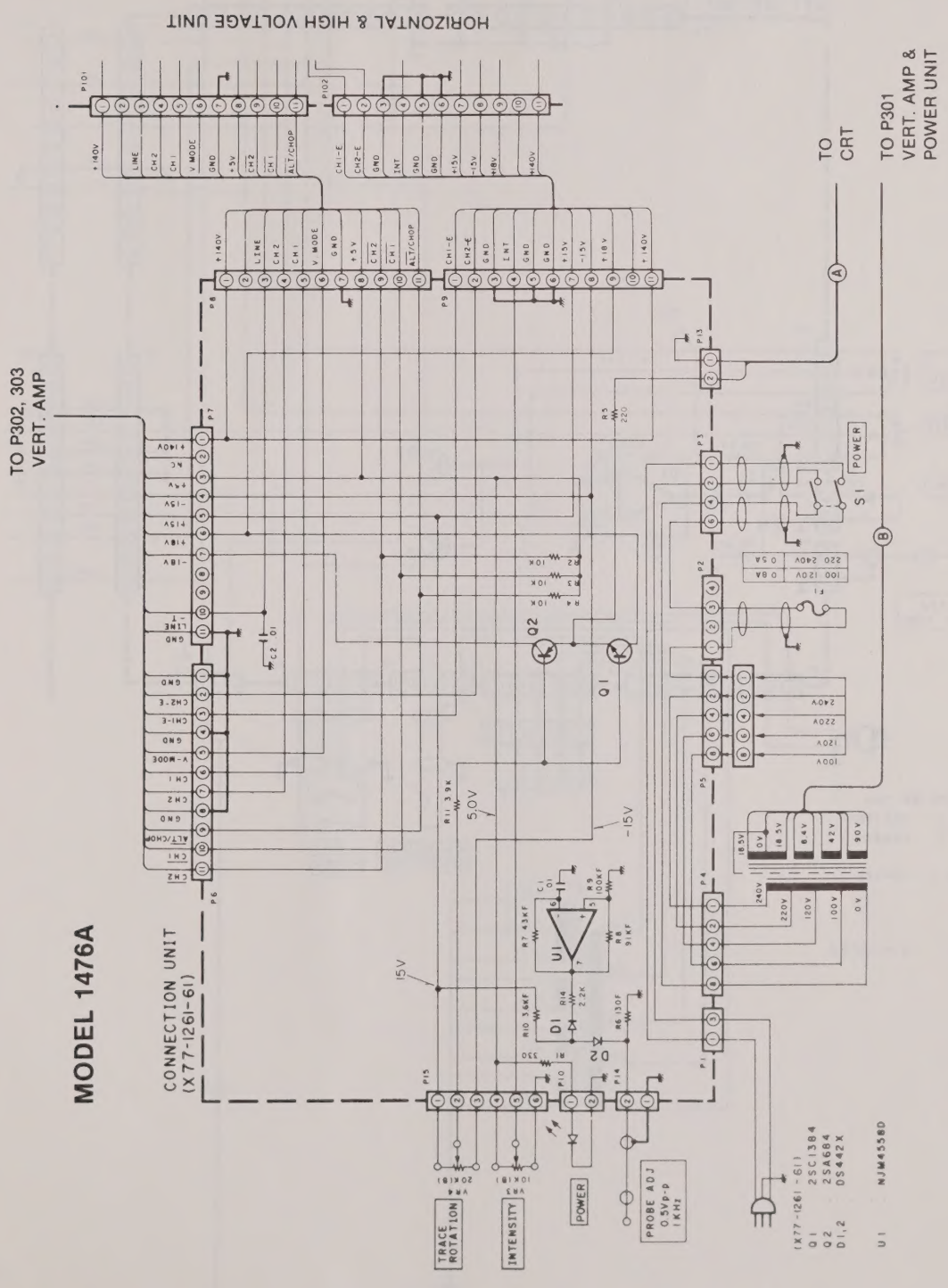
HORIZONTAL & HIGH VOLTAGE UNIT (X74-1340-031)

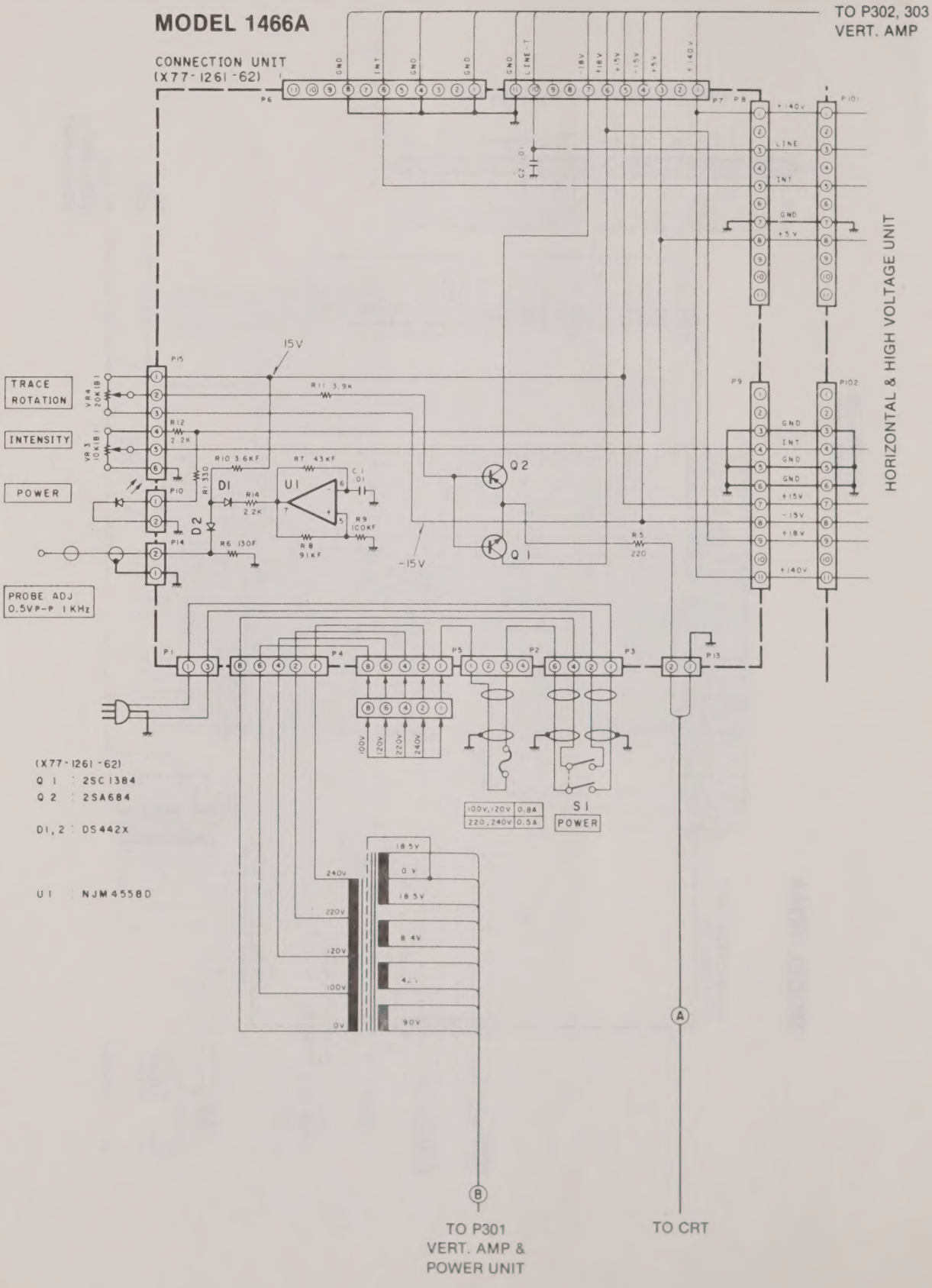




CONNECTION UNIT
(X77-1260-00)




MODEL 1476A
CONNECTION UNIT
(X77-1261-61)
TO P302, 303
VERT. AMP
HORIZONTAL & HIGH VOLTAGE UNIT
TO
CRT
TO P301
VERT. AMP &
POWER UNIT
TRACE
ROTATION
INTENSITY
POWER
PROBE ADJ
0.5Vp-p
1KHz
S1 POWER
Q1
Q2
U1
5.0V
-15V
15V
(X77-1261-61)
Q1 2SC1384
Q2 2SA684
D1,2 DS442X
U1 NJM4558D


MODEL 1466A
TO P302, 303
VERT. AMP
CONNECTION UNIT
(X77-1261-62)
HORIZONTAL & HIGH VOLTAGE UNIT
TRACE ROTATION
INTENSITY
POWER
PROBE ADJ
0.5Vp-p 1KHz
15V
-15V
Q1
Q2
D1
D2
U1
S1
POWER
100V,120V 0.8A
220,240V 0.5A
100V
120V
220V
240V
18.5V
0 V
8.4V
90V
(X77-1261-62)
Q 1 : 2SC1384
Q 2 : 2SA684
D1, 2 : DS442X
U1 : NJM4558D
TO P301
VERT. AMP &
POWER UNIT
TO CRT

B+K PRECISION DYNASCAN CORPORATION

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